SANITARY SUBJECTS

HALTON

No. 32. H. 35

BOSTON
MEDICAL LIBRARY
ASSOCIATION,
19 BOYLSTON PLACE,

Received.....

By Gift of.....

SHORT LECTURES

ON

SANITARY SUBJECTS.

BY

RICHARD J. HALTON,

LICENTIATE OF THE KING AND QUEEN'S COLLEGE OF PHYSICIANS;
LICENTIATE OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH;
LICENTIATE OF THE ROYAL COLLEGE OF SURGEONS, IRELAND;
LICENTIATE IN MIDWIFERY AND DISEASES OF WOMEN, KING AND QUEEN'S COLLEGE OF PHYSICIANS, COOMBE HOSPITAL;
MEMBER OF THE OBSTETRICAL SOCIETY;
MEDICAL OFFICER TO THE KELLS DISPENSARY;
MEDICAL OFFICER OF HEALTH TO KELLS;
ETC., ETC.

"Nostra omnis vis in animo et corpore sita: animi imperio, corporis servitio magis utimur."—SALLUST.

LONDON:
BAILLIÈRE, TINDALL, & COX,
KING WILLIAM STREET, STRAND.
PARIS: BAILLIÈRE. MADRID: BAILLY-BAILLIÈRE.

1874.

LONDON:
PRINTED BY BAILLIERE, TINDALL, AND COX.
KING WILLIAM STREET, STRAND.

DEDICATION.

TO

DILLON KELLY, Esq., J.P.,

PHYSICIAN TO THE FEVER HOSPITAL, MULLINGAR,

These Lectures are Inscribed,

IN ADMIRATION OF HIS PROFOUND AND VARIED SCIENTIFIC ATTAINMENTS,

AND IN GRATEFUL ACKNOWLEDGMENT OF

MUCH VALUABLE INSTRUCTION, AND MANY FAVOURS,

PERSONAL AND PROFESSIONAL,

BY HIS FORMER PUPIL

THE AUTHOR.

Digitized by the Internet Archive
in 2011 with funding from
Open Knowledge Commons and Harvard Medical School

http://www.archive.org/details/shortlecturesons00halt

PREFACE.

It has been always a truth, though, until latterly, a truth by no means widely accepted, that a large experience in disease was the most secure guide in seeking out the means by which that evil might be avoided or prevented and the public health improved.

A more correct appreciation of the present position of Sanitary Science has, however, led to a most important change in this respect; and Simpson and Gairdener, in Scotland; Paget and Rumsey, in England; and Stokes and Hudson, in Ireland, with a host of other distinguished physicians, have brought the light of their vast clinical experience to bear upon sanitary problems with excellent results, in their better elucidation and more exact application.

In the following pages, therefore, while State Medicine, properly so called, has been by no means neglected, or passed lightly over, particular attention has been paid to Sanitary Science as it affects the individual, as it is believed that if a sound educated opinion on sanitary subjects was

possessed and acted on by the educated and intelligent portion of the community, many sanitary evils under which almost all classes labour at present would rapidly disappear.

While avoiding as far as possible all controverted and still unsettled points, the aim of these papers being practical rather than speculative, it has been found necessary to explain the mode by which infectious diseases are supposed to be propagated. The weight of sound scientific opinion throughout Europe being in favour of the "germ" theory, that theory has been accordingly adopted, the more readily as it is emphatically a theory on the safe side. The precautions it points out cannot possibly do any harm, if the theory is not true, whereas if it is true—as it is believed to be—the neglect of them must be productive of widespread evil and destruction.

Technical terms have been as far as possible avoided, and where they of necessity occur their meaning is clearly explained.

Part of these Lectures having already appeared anonymously, the appreciation they met with seemed to justify their separate publication in a somewhat enlarged form.

HEADFORT PLACE, KELLS, CO. MEATH,
March, 1874.

CONTENTS.

LECTURE I.

THE NECESSITY OF SANITARY SCIENCE.

PAGE

DANGERS to be feared from a neglect of sanitary laws. Van Oven and Flourens on human longevity. Sanitary science as it affects the masses and the individual. The requirements of Sanitary science simply stated. Present condition of cities and towns in the United Kingdom. Evils of building speculations. Hecker's account of the epidemics of the middle ages in Bristol, Oxford, Norwich, Leicester, York, and London. Sweating sickness: its mortality. How these epidemics were checked. Building Acts necessary for the kingdom. Researches of Dr. Bowditch and Dr. Buchanan on drainage. Pettenkofer's views on cholera. Dr. Wilson on drainage and its difficulties. Water: its need. Sanitary rules for individuals. Physical and moral evils of our cities. Evil effects of damp in tenement houses. Experiment on rabbits. Fever: its spread in towns and cities. Importance of sanitary precautions. Moral effects of sanitary neglect. One of the remote causes of strikes. Influence of the example of the better classes on sanitary matters. Some dangers of modern philosophy. Objectors to sanitary precautions: who they are. Hudson on the absence of medical knowledge 1

LECTURE II.

AIR.

The difficulty of causing its value to be realised. Great rules of sanitary science well understood in ancient times. Effects of a total deprivation of air. Narrative of the steamship *London*.

PAGE

derry. The accident on board the *Magnus Troil.* Composition of atmospheric air. Carbonic acid : its dangers. Extraordinary cave in Italy. Window gardening. Impurities of the atmosphere : their influence in the production of disease. One of Nature's beautiful provisions for avoiding the danger. Evils of slaughtering in towns. Sulphuretted hydrogen ; its danger. Experiments on dogs. Medicated air. The solar rays. Sound : its production. A silent world. Mismanagement of air more dangerous than its impurity. Different modes of its mismanagement by the richer and poorer classes. Rebreathed air. Ozone : its absence in close places. The influence of different levels on air. Simple experiment to test the height of mountains. Effect of mountain air on invalids. Change of air. Meteorology. Ruskin on the advantages of its study. Good effects of pure air on severe injuries. Former mortality in the British Army from the want of it ; present improvement in this respect. Beautiful provision of Nature to lessen our risk from rain. *Three practical recommendations* 17

LECTURE III.

SANITARY SCIENCE IN THE SICK-ROOM.

Disease an entity. Modern research tending towards its elucidation. Fresh air important to the sick. Properties of hospital air. Difference in the mortality in the French and German armies. Castle hospitals at Balaclava. Difficulty of having plenty of air without draught : means of obviating it. Disinfectants as aids to ventilation. Precautions in washing clothes worn by patients with infectious disease : sad results from their absence. Simple sanitary amulet. Necessity of keeping food and drink covered in the sick room ; Professor Champouillon Val de Grace : his case in illustration. Floating particles of decaying matter : their danger. Case in the Children's Hospital at Birmingham in illustration. Best kind of couch in sickness. Proper coverings to be used, and mode of using them. Directions for general conduct and demeanour of attendants in the sick room. Food : intervals between. Value of moral impressions in sickness. Strict obedience necessary to the physician in attendance. Disastrous results of disobedience. Sanitary precautions after illness, in the room and person. Disinfection of clothes and bedding. Disinfecting power of heat : instance from Petherick's "Travels in Africa." Room fumigation. Convalescence : precautions to be observed. Relapses, how brought on. Useful physical and moral lessons to be derived from illness 31

LECTURE IV.

VENTILATION.

PAGE

Two peculiarities of the human mind illustrated by sanitary science. Impure air largely breathed in private dwellings. Defective construction of workshops. Effect on the young tradesman of a bad air supply; habits it leads to when long subjected to its influence: his ultimate fate. Where the blame lies. Effects of modern legislation. Ancient Gothic temples: their construction. The sufferings of the rich from impure air. Experiments and observations on air in convict prisons. Lessons taught to mankind by the lower animals in the matter of sanitary precautions. Pseudo-science and physical progression. Ingenious method of ventilation adopted by bees. Effect of deficient ventilation in the causation and spread of typhus fever. Quantity in cubic inches of air required by an average man; for each breath; for a minute; for an hour. Allowance of cubic space in hospitals. Natural ventilation; mode of observing it in an ordinary apartment. Method of ventilating and heating combined. The Galton stove. Dr. Stallard's air-ceiling. Ventilation of small rooms; precautions to be observed. Ventilation of railway carriages. The plenum method of ventilation. Noxious influence of vitiated air in a crowded country church. Ventilation of the Chapel Royal during the marriage of the Princess Royal. Mode of ventilation adopted in the Houses of Parliament. Precaution necessary in using stoves. Beautiful provision of Nature for enabling us to resist the influence of bad air. Successful example of artificial or mechanical respiration. *Three practical recommendations* 46

LECTURE V.

THE RELATION OF POPULAR LITERATURE TO THE PUBLIC HEALTH.

Influence of writings of an evil tendency on the mental health; disastrous effects on French society. Poverty in Lille. Death-rate of England and France compared. Hecker on the Duty of Physicians to the State. Influence of literature on crime in England. Declaration of the London magistrates in 1852. Moral, physical, and intellectual natures closely united. Pseudo-education. M. Ducpitraux ("Etat Intellectuel des Accusés"). M. Hayem's

PAGE

Tables of Crime. Certain penny publications ; their effect on the public health in the production of nervous diseases. Increase of nervous diseases. Increased mortality from brain diseases ; as a cause of intemperance ; as a cause of pauperism. Difficulties in the way of remedying the evil. The Liberty of the Press. Objectionable reports. Hurtful example of suicide when peculiar in any way. Consideration of plans to remedy the present evils. Necessity of a remedy. Evil consequences to the artisan and labouring classes from a continuance of the present state of things. Responsibility of writers of a higher class in setting a bad example. The best hope of a remedy 63

LECTURE VI.

FOOD.

The magnitude of the subject. Extreme fondness for fat of the inhabitants of cold countries. Different descriptions of teeth. Influence of food on the physical and mental qualities of mankind. Bears of India and America contrasted. Derivation of all foods. Mineral food. Quantity of food necessary to support life ; difference in this respect between hot and cold countries. Anecdotes of the Esquimaux. Liebig on the Diet of the Bavarian Wood-Cutters. Russian official return of allowance of food to peasants. Daily ration of a German soldier in the Franco-Prussian War. Daily ration of the British soldier in India. Daily ration of an English soldier in the reign of Edward VI. Diet of London needle-woman and Scotch farm labourer compared. Fatal effects of insufficient quantity of food ; its influence in the production of fever. Mortality in the British Army during the Crimean War from insufficient food supply. Effects of insufficient food in Millbank Prison. Dr. Smith's handbills for times of scarcity. A fattening diet without meat. Best time to eat bread. Adulteration of bread. Letheby on Food. Punishment in old times for fraudulent bakers. Barley and Indian meal ; their nutritive qualities. Peas. Rice. The cheapest of all foods. Arrow-roots. Ripe fruits. Potatoes. Quantity of water in food. Mode of purifying suspicious water. Milk ; its adulteration ; deaths caused thus. Meats ; their different nutritive values. Extract of beef. Poultry. Bacon. Fish. Experiments of the French Academy on the effects of salt in food. Antiseptic power of the human stomach. Cheap dinners for the people. The Lenten fast. Suitable hours for meals. Cooking. Cause of French pre-eminence in culinary art. Moral effects of food. Whisky. Tobacco. Tea. Case illustrative of the effects of excessive tea drinking. *Three practical recommendations* . . . 76

LECTURE VII.

CLOTHING.

PAGE

Importance of proper clothing to the preservation of the health. Erroneous opinions on this subject. Clothing of the ancient Britons. Fashion in the reign of Edward the First. Sumptuary laws well intended. First appearance of bare arms. Clothing in the reign of Elizabeth. Fashionable dress in the reign of Charles the Second. Evil results of a want of sanitary science in those days. Sources of animal heat contrasted as to their effects. Sensibility to cold at different periods of life. The respiration; its influence on bodily temperature. Mode by which heat is generated in the body. Injurious effects of draught. Effects of prolonged cold. Use of clothing in keeping out heat. Materials suitable for clothing. Linen, calico, and flannel contrasted. Experiments to test the heat-conducting power of flannel. Caution to be observed in leaving off winter clothes. Proper clothing for summer. Good effects of proper clothing. Experiments of Franklin on the colour of clothing. Mode of wearing clothes. Tight lacing; the cause of a red nose. Boots. Evils caused by improper make and shape of boots. The proper covering for the feet. Head covering. Modern bonnets; the evils they cause and a mode of preventing their occurrence. Contrasted effects of proper and improper clothing. Diseases caused by insufficient clothing; moral effects; pauperism. Ball dresses; dangers to which the wearers are exposed. Waterproof coverings. Evil effects of wet; means taken by Nature to obviate them in water-fowl. Ventilated oil coats. Description of the leather coats of Harold's soldiers. Night clothing. Difference between the waking and sleeping temperature of the body. Eider down; its imitations 96

LECTURE VIII.

CLEANLINESS.

Anatomical structure of the human body. Wonderful instance of the multiplication of type. Structure of the skin; sweat tubes, nerves, and blood-vessels. Effects of injury to the skin. Functions of the skin. Perspiration. Skin breathing. Accident at the Fête de Bœuf Gras in Paris. Evils suffered by the children of the poor from a neglect of the skin; physical and moral. Duty of those who have influence with the poor to enforce cleanliness.

PAGE

Depression of nervous energy through influences acting on the skin. Growing taste for showy apparel amongst the working classes productive of great injury. Proper means of keeping the skin healthy. Objectors to sanitary precautions in this matter. Striking illustration of the powerful effects of water on the skin in dangerous illness. Weight of the matter passing through the skin daily. Erasmus Wilson on Ablutions. Natural oily secretion of the human skin; its advantages. Mapother's description of a Turkish bath. Power of the skin in resisting extremes of heat and cold. Modern doctrinaires and the monkey. Close sympathy of the skin with the stomach, lungs, and brain. Dr. Coombe's account of his own recovery from consumption. The effect of sunlight on the skin. Influence of the skin on the nutrition of animals. Chadwick on the Economical Effects of a Clean Skin. Hair and nails; modes of dressing them. Hair dyes. The cold bath; its effects. The tepid bath. Amateur theories of the water cure. Anecdote of Burke. Medical advisers should be consulted when there is any delicacy of constitution before deciding on the kind of bath to indulge in. Flesh brushes. Moral effects of cleanliness. Cleanliness during epidemics. M. Grimaud's precautions. *Three practical recommendations* . . . 111

LECTURE IX.

SANITARY SCIENCE IN RELATION TO THE TRAINING AND EDUCATION OF THE YOUNG.

Importance of proper training in youth; its influence on the future destiny of the nation. The minds of children; effect of the judicious application of sanitary principles on their future. Period of development of the reasoning faculties. The most important point in the moral training of a child. First great error usually committed in training children. A mild, yet effective punishment. Differences in the temperament of children, and consequent difference in the methods to be adopted in their training. Fenelon on childrens' rewards. Punishment should be very rarely inflicted. Tanner on the Training of Children. Proper age to commence study; evil effects of premature study. The nursery. Hunter's receipt for rearing healthy children. Letheby's diet rules for children and youths. Fondness of children for sweets; curious circumstances under which, in adult life, this taste returns. The evil of constrained positions. The way to give a graceful carriage. Children's baths; their composition and proper temperature. Children's dress; their sleeping rooms and beds. Cheerful demeanour; its good effects

PAGE

on the young. Archbishop Whateley on the Training of Children. Best mode of commencing the training of the mental faculties. Great deal of amusement necessary. Out-door exercises. The care of the teeth. Articles of diet to be avoided. Anecdote of Queen Margaret of Anjou. Functions of the brain in growing youth. Evil effects of tobacco on growing boys. Books fit for young people. Powerful effect of good example on children. Their quickness of discernment and its influence on their behaviour 129

LECTURE X.

EPIDEMICS.

Dangers of epidemics. Fever caused by impure drinking-water. Typhoid fever in the milk-can. Typhus fever in crowded localities; difficulty of confining it within bounds. Epidemic cholera; its mode of spread; early opinions on this subject; later opinions; present opinion. Mapother's cholera cases in 1866. Jackson on cholera in New York. Peter Rogers' cholera cases. Miasm and germ theory; proofs in support. Hecker on the sweating sickness; on the effects of damp on this epidemic. Cholera a disease of the plains. Difference in the number of cases occurring at different elevations. Infection through drinking water. Minute nature of the spores. Receptivity; conditions that produce it. Conclusions from the foregoing. Experiments in Paris. Small-pox; vaccination and re-vaccination. The mortality in the vaccinated and unvaccinated contrasted. Dress suitable for the physician and visiting clergy during an epidemic. Means by which epidemics may be resisted; three different classes concerned in their prevention. Parliament and the principal medical officer of health. Local boards; their duties. Importance of a proper water supply; deaths in London in 1854 from its absence. The Bristol cholera in 1832 and 1854; a contrast. Protection which obedience to the physical law gives in epidemic seasons. Tracing the steps of an epidemic; its first lodging on its arrival in a country; its spread; the effects of intemperance on its increase. Moral corruption the forerunner of epidemics. Sanitary clubs suggested. Nobles of the middle ages. A relentless foe. A great army of sanitary science. *Three practical recommendations* 144

LECTURE XI.

THE INFLUENCE OF AMUSEMENTS ON THE PUBLIC HEALTH.

PAGE

Interest taken in the amusements of the ancients. Nature of their amusements a good index of the character of a people. Out-door and in-door amusements. Cricket. Shooting. Swimming. Riding; an American writer on its advantages. The volunteer system beneficial to the public health. Amusements of women. Gymnasium for young ladies. Skipping-ropes and hand-ball. Walking; proper time to indulge in it; good effects on the system. Advantage of cheerful companionship during exercise. Time of meals in relation to exercise. A way to make solitary walks enjoyable. A naturalist's discovery. Proper length of a walk. Mental and physical exercise: their relation. Effects on the health. Persons who should not walk rapidly. Difficulty of applying the principles of sanitary science to the regulation of in-door amusements; impure air nearly common to all of them. The theatre; the present state of the stage. Moral and reflected physical effects. Alcoholic stimulants in theatres; evils resulting therefrom. Singing-houses and music-halls. Proper length of public entertainments; customs in this respect in Germany. Large chorus meetings; their advantages when held in lofty halls. Remedies proposed for the evils enumerated. Experience of the writer in London theatres. Games of skill; chess; backgammon; billiards. The people whom they suit respectively. Parties. Balls; public and private; evil results of present mode of conducting them on the nervous system; danger to health and life they present. The text repeated 164

LECTURE XII.

OVERCROWDING.

John Stuart Mill on air; on moral qualities of labourers. Pure air a part of the working man's wealth. Tenement houses in large towns and cities. Dr. Willis on the sanitary state of Dublin. Mapother's description of a blind court. Desperate ignorance of the principles of sanitary science amongst the poor. Act for the building of labourers' cottages not taken advantage of in Ireland. An Irish cabin. Fine tenement houses in Dublin; preference of the artisan class for them. Expense of good four-roomed cottages.

PAGE

Sanitary evils in London ; deaths from consumption due to overcrowding. Evil effects in the increase of pauperism. Bad effect of charity through the medium of the poor-rate. General mortality in London deceptive. Mortality high in some quarters and low in others. Mortality of different streets in Liverpool contrasted. Wretched sanitary state of the poorer quarters. Great mortality amongst the children; Professor Fawcett on this subject. Sanitary state of Glasgow ; the Rookery. Good effects of sanitary improvements. Belgian Board of Health on house speculators. Sanitary state of American cities. Appalling condition of the tenement houses in New York. Recommendation of Dr. James on the Council of Health. Similarity of medical reports and advice on both sides of the Atlantic. Mr. Simon on overcrowding. Moral features of the inmates of such houses. Irish exemption therefrom ; causes. Dangers of a continuance of the present state of affairs. Political danger. Good ventilation of gin palaces. Another reflected physical evil. Dickens on the English poor. Conclusion 178

SHORT SANITARY LECTURES.

LECTURE I.

THE NECESSITY OF SANITARY SCIENCE.

"Those who study the physical sciences and bring them to bear upon the health of man, tell us that if the noxious particles that rise from vitiated air were palpable to the sight, we should see them lowering in a dense black cloud above such haunts, and rolling slowly on to corrupt the better portions of a town. But, if the moral pestilence that rises with them and in the eternal laws of outraged Nature is inseparable from them, could be made discernible too, how terrible the revelation! Then should we see depravity, impiety, drunkenness, theft, murder, and a long train of nameless sins against the natural affections and repulsions of mankind overhanging the devoted spots, and creeping on to blight the innocent, and spread contagion among the pure."
—*Dickens.*

THE necessity that exists at the present day for a better acquaintance with the principles of sanitary science is constantly becoming more evident. It is only by a proper sense of its importance being widely diffused that there is any hope of the passage of those larger and more comprehensive sanitary measures which are still necessary to check the numerous evils, both moral and physical, that at present tend, not alone to lower the national character, but by impairing the public health, to impair also, to a large extent, the national resources. Indeed there are considerable grounds for apprehending that if the present state of things be permitted to endure, it will in the end produce some dreadful social convulsion, or some potent physical scourge,

which shall alter the present conditions of life, particularly in cities, in a manner no doubt sufficiently striking and effective, but which may not improbably also be accompanied by wide-spread terror and desolation. If this can be prevented by a timely application of the true principles of sanitary science, and of the fact that it can be so prevented, there seems no reasonable doubt, it would appear expedient that the natural laws which govern public health, restrain epidemics, or lessen their force, should be widely understood. The task of diffusing this most necessary knowledge, a task not without its own peculiar difficulties, naturally and properly devolves upon the medical profession. In the words of MacCormac: "Here, as in other instances, medical men must lead the way to the better appreciation of those laws. Medicine, indeed, must be studied by the light of experience, but we have also to add the light shed by a yet loftier science, the science that coordinates not merely medical philosophy, but the universal principles of all philosophy. The world desires to be informed at all points. It will require of medical men as of others, a reason for the faith that is in them. Nature, indeed, is sparing in causes, but she is fruitful in results. If Van Oven and Flourens in their recent works on human longevity be correct in estimating the natural duration of man's life at one hundred years,—the actual duration of human life, or some twenty years for the poor and forty for the rich, argues a prodigious amount of social inaptitude and short-sighted arrangements. The more general study of science, physiological science inclusive, at once by medical men and the more intelligent members of the community at large, would tend to supersede the unhappy results flowing from a narrow spirit of detail and the evils which accrue from the absence of all great generalisation."

Now to understand the measures necessary for our safety, it becomes important to have clear views of the nature and extent of sanitary science. To attain these it will be convenient to examine it under two aspects, as it affects the masses, and as it affects the individual. Though its object

is the same in relation to both—namely, to maintain them in the best state of health possible to them. Yet the means it takes to attain this end with each are in some respects different.

In large masses of people, as the population of cities and large towns, the rules of sanitary science as regards them appear at first sight sufficiently simple.

That they should have pure air to breathe, pure water to drink, and pure or unadulterated food attainable in sufficient quantity by purchase. This is absolutely all that sanitary science requires, as far as the masses are concerned.

Though easily stated, when these rules come to be more closely examined, their practical application is found to present a good deal of difficulty. To breathe pure air it is necessary that the drainage should be perfect, that all noisome manufactures should cease, or their processes be rendered innocuous; that all slaughtering be done without the city boundary, and that measures should be taken to prevent over-crowding in tenement houses and other places where it now undoubtedly exists. It will be seen, therefore, that many and important interests are bound up in the first and apparently simple requirement of pure air. It is at once apparent that any real solid sanitary reform must stir up a fierce opposition, which will be not the less fierce because its promoters are in the wrong. The evils however, which flow from the present state of things, and the further and worse development of those evils with which we are threatened, should the present state of things continue, so far over-balance any class considerations, that any sensible intelligent man who reflects on the subject will have no difficulty in deciding against the continuance of the present abuses, let their removal cost what it will. That the measures necessary for their removal would conflict with many interests is undeniable, but the conflict would be in truth more apparent than real, for, the measures once carried, the whole community would receive such benefit, that the first apparent loss would be over

balanced by the profit that would accrue in the immediate future.

To the better consideration of the subject it will be necessary in the first place, to review shortly, the conditions of life that at present obtain in most of our cities and great towns, and even in a vast number of our smaller towns and villages.

The great commercial prosperity and the consequent development of manufacturing activity have drawn a vast and increasing population to seek habitation close to places where plentiful employment and good wages are to be procured. The erection of cheap houses for their accommodation has become a lucrative speculation; and as ground is always valuable in those localities, to make the speculation pay it is necessary to use as little of it as possible, The consequence is that a number of narrow streets, lanes, and alleys have sprung into existence, huddled close upon one another, the houses constructed of the cheapest and least durable materials, and with either no provision for proper drainage, or a mere appearance of such provision. The natural result follows. They are always out of repair; often crumbling to ruin; their basements sodden through with damp and filth; and when they do fall or become so dangerous as to necessitate their destruction, from their rotten rubbish other houses arise in no way an improvement on their predecessors. Sun-light is a rare luxury in such abodes, and pure air an impossibility. Thus, civilisation has in its progress inflicted on the inhabitants of cities the same inconveniences which arose centuries ago from its absence in the first formation of European society. It is to be hoped that the same *evils* will not also follow; but it must be borne in mind that like causes as a general rule produce like results. What these results were may be seen with sufficient clearness in the pages of Hecker's "Epidemics of the Middle Ages." He thus speaks of the black plague in the fourteenth century:—

"Owing to the accumulated number of the diseased, not only individuals, chambers and houses, but whole cities

were infected, which moreover in the middle ages were with few exceptions, *narrowly built, kept in a filthy state and surrounded with stagnant ditches*," to which our cesspools in many places would correspond. "In all Germany, according to a probable calculation, there seem to have died only 1,244,434 inhabitants; this country was however more spared than others; Italy, on the contrary, was most severely visited. It is said to have lost half of its inhabitants. We have more exact accounts of England; most of the great cities suffered incredible losses, above all Yarmouth, in which 7052 died; Bristol, Oxford, Norwich, Leicester, York, and London where, in one burial ground alone, there were interred upwards of 50,000 corpses arranged in layers in large pits. Morals were deteriorated everywhere, and the service of God was, in a great measure laid aside, for in many places the churches were deserted, being bereft of priests. The instruction of the people was impeded, covetousness became general, and when tranquillity was restored, the great increase of lawyers was astonishing, to whom the endless disputes regarding inheritance offered a rich harvest. The want of priests too throughout the country operated very detrimentally upon the people." Now, though Hecker himself leans to the opinion that the causes of the Black Death were telluric or astral, yet a much more probable explanation is to be found in the low state of health which populations living in such localities as he describes, would be almost of necessity compelled to endure, and which would render them an easy prey to any virulent epidemic. It is of interest to note that then, as in the modern cholera epidemics, the mischief spread from the east.

That we are in a much better sanitary position than generally obtained in those remote times is undoubted, but it is also to be feared that our position is becoming less and less secure every day. He describes another plague, "The Sweating Sickness," which also caused frightful mortality, and it is of importance to observe that each successive attack from its first invasion in 1485, to its

last in 1551, after which date it no longer assumed serious proportions, was less than the former. That a corresponding improvement in the sanitary conditions under which the people lived fully accounted for this fact, may be seen from the following extract from his work on that disease: "As people acquired confidence in the security of peace, it ceased to be necessary to protect every country town by fortifications. The walls were thrown down, the stagnant moats were filled up, and, as people were no longer *limited to a narrow space,* they built more convenient houses in airy streets, *the dark alleys and damp dwellings* underground were gradually abandoned, and a more comfortable mode of living superseded the former misery. By this means the mortality was considerably diminished, and the power of epidemics was checked." One class, however, whose mode of life did not share in the general improvement—namely, the soldiers, still suffered severely. Now, we may here observe, that no matter what minor sanitary measures are passed, no matter how numerous or efficient our sanitary staff, until a comprehensive Building Act is procured, the public health must remain in considerable danger should we be visited by any great epidemic. It is impossible to do anything to improve the condition of some localities. There is no effectual means of dealing with them short of total demolition; but, as this would leave many people without a shelter, it is of course at present impracticable. The evil, however, could be cured, if more gradually, quite as effectually, if it was enacted, that after a certain date, no house could be built for the purpose of human habitation within the kingdom, without a certain space in its vicinity to admit the free access of air and sun light, and a certain internal cubic space in proportion to its intended number of inmates. This is a subject that should be made a question of state policy, and if successfully dealt with, the benefit accruing to the nation would be simply incalculable. Stringent measures should also be passed to ensure the proper drainage of the ground used for building purposes. The researches of Dr. Bowditch, in America,

and of Dr. Buchanan, in England, have clearly proved the immense influence which improper drainage, or damp soils has on the production of the most fatal lung disease of modern times, Consumption. The writings of Pettenkofer, in Germany, also show the serious influence which damps exercises in the increase and spread of cholera when it is epidemic. It is, therefore, of the utmost importance that a complete system of drainage should be enforced. The difficulty that exists in carrying out this is however often very great, and it always requires skilled engineering superintendence to pronounce as to the nature of the soil, and the kind of drainage that may in consequence be necessary. Dr. Wilson in his excellent work on public health, thus clearly puts a case in point—"A stratum of gravel or chalk covering a sloping bed of impervious clay is necessarily a dry soil, because the rainfall rapidly sinks to and flows along the surface of the inferior slope, whereas the same stratum in a valley may be actually waterlogged, although the depth of the stratum may be the same throughout." Besides securing dryness of the soil, the drainage also fulfils a most important use in preventing the accumulation of sewage matter, which by its retention in the sodden ground is so fruitful a cause of fever; and when the water supply is obtained, as it often is, by pumps sunk in the vicinity of dwelling-houses, its value is inestimable.

The dreadful consequences that frequently follow on using bad or polluted water are now too well known, and too widely acknowledged to need insisting on them in this place at any length, while its undoubted agency in the speed of Asiatic Cholera may be merely alluded to. Several of the chief cities of the empire are well supplied, but others and more notably our second rate and smaller towns are still lamentably deficient in this respect. The need of pure water has however been so thoroughly impressed on the public mind, and so many excellent examples have been given of the possibility of procuring it, that legislation calculated to extend the benefit would probably meet with but little opposition. The same remark will also

apply to the adulteration of food, and already, some efforts which it is to be hoped will prove fruitful, have been made, and are making to lessen this evil, and to supply, as far as legislation can supply it, the third requirement of sanitary science in the case of large populations.

The rules of sanitary science as applied to the individual, are different, and indeed very much more complicated; for it may be stated as a fact, that an individual living in a community where the principles of sanitary science as detailed above, were fully, thoroughly, and correctly applied, might, by a neglect of those rules which ought to govern individuals, endure a very much worse state of health, and be in every respect in a worse sanitary position than another individual, who, living in a community where sanitary laws were disregarded, still obeyed the rules of sanitary science in his own person. This is undoubtedly a consoling and encouraging reflection, and should stimulate those who labour at present, apparently in vain in the cause of sanitary reform, not to relax their efforts, for the good those efforts effect in individual cases here and there, will no doubt increase in course of time, and finally, by creating a sound public opinion with regard to sanitary matters, render the larger legal changes possible.

If we might lay down three short sanitary rules for individuals, we would say—Breathe pure air night and day, take sufficient exercise mental and bodily. Keep the skin clean. These are however very imperfect, and indeed, not universally applicable. It will be therefore better to refer the reader to the succeeding papers where the personal detail is entered on at length.

In considering the physical and moral evils that accrue in a large city from the neglect of the rules of sanitary science, and the latter are neither less marked or less important than the former, the physical evil is at first sight very unequally distributed. In the poorest and most overcrowded parts of the town fever abounds, and the general health is at a low standard. The faces of the residents in those localities are generally sallow, and their

aspect either sullen or spiritless. Their clothing is very often damp and mouldy; that of the female easily torn, and therefore usually untidy looking when not absolutely ragged. This is due in part, no doubt, to the inferior character of the fabric when purchased, but there is an additional cause at work in the damp atmosphere which always exists in these overcrowded rooms. The air is constantly loaded by decaying particles which in a short space of time penetrate clothing and render it liable to tear on the slightest touch. The general charge sometimes preferred of intentional untidiness and carelessness in the matter of wearing apparel on the part of the poor is therefore very often unfounded. The sodden character of all back yards in these quarters, and the accumulation of damp dirt which is always to be found in a humid climate like ours on floors, stairs, and passages, in tenement houses, or small overcrowded cottages, has a most deleterious effect on the poor children who inhabit them. They suffer much from cold feet from this cause, and from consequent congestions of other parts, giving rise to many chronic maladies, and even in some extreme cases, causing permanent lameness or crippling, particularly in those predisposed to scrofulous diseases. And it would be hard, indeed, if the existence of predisposing causes are sufficient, to suppose any inhabitant of these localities in a state of non-predisposition. They all breathe bad air, and breathe it constantly; they have little or no sunlight, they are often ill-fed, and worse clothed; little more indeed is required. A great French pathologist found he could develop tubercular disease of the lungs in healthy rabbits, by merely shutting them up in a dark and damp cellar for a sufficient time. It would not therefore be surprising if tubercular or scrofulous disease should happen to be both common and fatal in these localities, and that such is the fact, is admitted by every one who has given the subject any attention.

But the question now arises—Are these evils really confined to the poorer quarters of the town?—a most important one for the wealthy and well-to-do inhabitants.

The answer is unanimous from every class of educated observers—sanitarians, statisticians, clergymen: they are not. These evils overflow from their very nature. The nobleman or rich merchant in his daily walk, jostles the poor clerk, the labourer, or the artisan, and fever, when it is catching is no respecter of persons. It is true, also, that those who have not or have never had the disease themselves can carry it in their garments and give it to those who, by the peculiar condition of their system at the time, are predisposed to take it, but it does not require an actual meeting to propagate disease. In large cities there is a continual intercourse going on between all classes of the population; servants have friends or relations living in those dens, who will communicate with them, and even exchange articles of clothing, despite the most careful precautions and the most stringent orders. It is very often impossible to explain how a case of infectious disease suddenly arises in a place where it has not hitherto been observed, and where, as it would appear from the evidence, there was no communication held with any centre of infection. It *seems* strange, but then the evidence is often unreliable. There are potent reasons why an acknowledgment of violation of orders should be impossible to be obtained, when its production would do damage to individual interests, and serve only the interests of science. It is, therefore, quite impossible that one part of the population of a city shall be diseased, squalid, and miserable, while the other shall remain in the secure enjoyment of health and happiness. It is vain to expect it. The death-rate is supplied by the rich as well as by the poor, and if the appearance of disease is sometimes modified by the circumstances of the patient, it is still disease. This is at all times true, but during the prevalence of epidemic—as cholera, or small-pox—it is peculiarly so. Then it becomes a matter of vital importance to the rich that the poorer quarters shall be looked to, for the poison, if allowed to gather force there, unchecked, will speedily attain such proportions as to defy all efforts at its sup-

pression, and will in the end take as many victims, in proportion to their number, from the rich as from the poor. It is also to be noted that though a rich man may rarely, in non-epidemic seasons, catch typhus fever, yet when he does get it, it is invariably more fatal to him than to his poorer brother, and the same is probably true of other diseases. Thus it will be seen that it is everybody's interest—not alone that of the poorer part of the population—to see that the sanitary laws necessary for the well-being of a large population be thoroughly applied.

If we now proceed to consider the moral effects produced by sanitary neglect, we will discover that they are not by any means unimportant. One of the characteristics of unhealthy, overcrowded neighbourhoods, and perhaps the most striking to a casual passer through them, is the number of gin palaces that seem to rise up in every street where misery and want are joined to numbers. This points to a very interesting fact in connection with the influence of bad air on the public health, which will hereafter be examined more at length. That bad air produces a very decided effect on the brain is within ordinary experience; the dizziness and oppression that are felt in, and after coming out, of a crowded public conveyance, particularly on a wet day, is one very common result. In the case alluded to it is merely a temporary inconvenience, but it may help us to a better understanding of the effect likely to be produced on a person who breathes that air every night for some hours, and an air that is perhaps nearly as bad, for several hours during the day. Now this, when long-continued or habitual, gives rise to a state of what may be called "chronic cerebral irritability." The symptoms are to be seen in the short, quick, quarrelsome temper, the restlessness under steady occupation, and the craving for excitement, which in modern times has been continually growing, and which is usually sought for in the gin palace, but often also in places still more degrading and debasing. Men under

these influences are very easily led by those interested to take unfavourable views of the class above them, to overrate themselves, and to get up a general sense of being badly used, which in our age and country terminate in strikes—often without any real justification—and in other times and countries produce political revolutions and *émeutes,* sometimes of the first magnitude. Now this, however unreasonable and unjustifiable on the part of the men, is only what might be very confidently predicated to occur, by any sensible employer or clear-headed statesman acquainted with the practical principles of sanitary science, or knowing how and where these men were obliged to live. It is indeed, in one sense, by no means unreasonable, when it arises—as it sometimes, doubtless, does arise—from the employer's neglect of his dependents. The men, in these cases, become gradually demoralised, and it is, unfortunately true, that moral evil is not confined to the class in which it first arises, but by a law similar to the law regulating the diffusion of gases in the atmosphere, tends continually either to ascend to the class above it, or to descend to the one beneath.

There is, then, a serious duty devolving on those who, by their birth, talent, or riches, have attained a position which renders their example powerful in society. On the course they take depends in a great measure the success or failure of every project directed to the general improvement. It is, above all, incumbent on them to show by their conduct a respect, not only for the great physical laws, but also for the higher and greater moral laws, for it is in vain that we may hope to have the first made effectual for the public good, if the latter are forgotten or disregarded. There is, underlying all sanitary science, and without which its rules cannot be effectually observed, the principle of self-denial. It is necessary that this should be consistently practised if we would have health. If those whose superior position renders it in a manner obligatory on them to be the guides and leaders of their

humbler brethren, forget this most necessary duty, what can we expect from the classes who are intellectually and socially beneath them; who, with much fewer mental resources, have much more powerful temptations to error? But what shall we say if, instead of leading them aright, they should deliberately teach them principles—and by their example practices—which are inconsistent, not alone with public health, but, in their full development, with all order and religion? That this has been done in other countries is too true; let us hope that pseudo-science here is not drifting in the same direction. A vivid picture of such a state of things is thus painted for us by the famous German philosopher and Historian, Gorrès, in his work on "Europe and the Revolution:"—"The *literati*, who had formerly gone to Court, now, after having there finished their schooling, turned to the people and preached to them another doctrine—of the God who resided in matter, of the heaven to be found in the senses, of morality that consisted in cunning, and of the felicity that voluptuous indulgence afforded, and that all beside was vain, deceptive, and jugglery, whether at Court or in the Church. That warm, genial view of the Middle Ages, which, in the same way as antiquity, gave life to mountains, springs, and trees, looked on the State in all its members and parts as a thing endued with vitality, and procured for them, as so many essential personalities, love and attachment; that warm, ennobling view had long since passed away. In room of this the doctrine of political materialism had descended from the high to the lower regions of society, and for warm life had substituted cold abstractions, cyphers, and rigid geometrical forms, which cut sharply into private life; and for such dead abstractions it was impossible to feel affection. Then began the civil war which, while the sword without destroyed its victims, preyed within on the entrails of the State, and this frenzy of faction was inflamed again by its own slaver to new blood-thirstiness.

The very elements of Nature, burning, as it would seem,

with a like fury as the social elements, must in a degree become instruments of death, and iron, fire, and water devoured their victims. Terrorism raged—with her drownings and her shootings, her proscriptions and confiscations, her maximum requisitions and universal plunder; public bankruptcy and famine closed the procession of the furies." It is true, then, that the moral atmosphere of any place is created by the greater or less morality of the majority who live there, and almost every one is more or less affected by it. Thus the superior class, who looked coldly on at first, if they did not aid the progress of moral degradation in the class below them, suddenly discover that they are equally injured by the spread of that which by timely exertion on their part they could have very possibly prevented. In this, as in the former case, there is no doubt the individual can hold himself free, aloof, and stainless, but the task is a difficult one. It is one attempted by few, and succeeded in by perhaps fewer still.

The necessity, then, for sanitary science may be taken to be sufficiently well established. It is equally necessary for the rich as for the poor; even more so, perhaps, for the rich; the poor man, having little to lose, will be scarcely injured by any violent change, while to the rich man it may be ruin. It is evidently the duty, then, of all to co-operate. Each one can do something to dispel the mists of misrepresentation and prejudice by which many parts of the subject are still obscured, and it unfortunately happens that prejudice and misrepresentation are still powerful in opposition, and it may be expedient here to say a word or two concerning those who decry sanitary science, and deny the efficacy of the remedies it proposes. They may be generally divided into two classes. The first of these are persons who, though intelligent and impartial enough on other subjects, have some personal interest or perhaps some commercial speculation which would be injured by the due enforcement of sanitary laws.

This class it is hopeless to try to convince, for the reason given in the jingling rhyme of the ancient proverb.

The second class, however, deserves a fuller consideration. It is mainly composed of persons who are disposed to take half views of large subjects, and having, perhaps, happened to see occasional failures of sanitary measures occur within their own personal experience, they jump to the conclusion that sanitary measures are never valuable. Their ranks have furnished the various protesters against vaccination, and they are constantly on the alert to take up, distort, and exaggerate, probably unconsciously enough, every fact or seeming fact that goes to support their view, or rather purview of the question. Quacks of various sorts constantly supply them with these for their own purposes, and under the influence of an honest but thoroughly mistaken conviction that they look upon the sanitary laws as a violation of the Magna Charta, and a gross interference with the rights and liberties of the subject. To this class it is right to speak with all the respect due to persons actuated by motives which, if mistaken, are sincere.. We would say to them, LEARN; study the subject not in the pages of angry newspaper discussion, but by inquiry amongst your most intelligent acquaintances. Reflect that laws which have been passed with the consent and approval of the great mass of your countrymen, which have been adopted in every state throughout the civilised world, are likely to have some rational foundation; above all, avoid those pseudo-medical stump orators who by their public language have rendered themselves unworthy to be considered citizens of the country of Jenner. They may be honest too, or some amongst them, for in the present age nothing is impossible; but if they are, what gross ignorance does it not disclose! Such men as these have always been the bane of medical science; the stumbling-block to the half-educated, superficially informed, unwary, and we cannot do better than conclude by quoting in their regard the eloquent words of Hudson in his essay on "Method as applied to

the Study of Clinical Medicine." As sure as Immorality is the parent of Infidelity in religion, so surely is Ignorance the parent of Scepticism in medicine. The ignorant practitioner stands by the bedside of his patient denying the existence of powers of which he is ignorant, and of resources of which he is not master.

LECTURE II.

AIR.

"The prime necessity of life is air, the first and last act of our existence is to breathe it, and the most essential condition of health is its purity."—*Mapother on Public Health.*

AIR—fresh air—pure air—how often has its necessity been preached by the medical profession, by the clergy, by the intelligent of all classes, and yet—discouraging reflection—how completely, how entirely has it as yet failed to penetrate the masses of the people: even the wealthier classes are unmindful or indifferent, and numbers of them, as well as of their poorer brethren, suffer and die every year as the penalty of their ignorance or neglect. To save even one life is worth some risk and trouble. It seems right, then, that a further attempt should be made even at the risk of being considered tedious or common-place, to put the first principles of sanitary science plainly and simply forward once more. This will be best done by simply stating the great laws by which mankind is governed, and pointing out in plain language the evils which follow on their violation, excluding, as far as possible, scientific terms and modes of expression.

The relation between the moral and physical law is much closer than is popularly imagined, and without at all comparing them in importance, it will be necessary and interesting hereafter to see how close is their inter-dependence. The moral law is first, for it is by obedience to it the soul is saved. The physical law, though infinitely less important, is still to be obeyed as coming from the Creator, and

by it the life of the body is preserved, and its earthly happiness or health attained. Though sanitary science was not until late years assiduously cultivated amongst us, its great rules were well understood in former times, for one of the works of mercy recommended in all ages by the Church was burial of the dead. That was not like visiting the sick, an act of charity to the subject of it; it was rather an act of charity exercised towards the living, by restoring the poor worn-out frame to the bosom of its mother earth, and thus preventing its decay injuriously affecting the survivors.

The greatest, the first command of the physical law is—breathe fresh air. God never gave a command or imposed an obligation that could not be obeyed, and consequently we find air everywhere. The strongest man and the weakest infant, the greatest noble and the poorest peasant, breathe it alike, without stint as without effort. But though the physical law commands us to breathe fresh air—and fresh air is supplied in abundance—man himself puts obstacles to the bounty of his Creator, and absolutely abuses the glorious gift which he receives, sometimes by his ignorance, often by his carelessness, and oftener by both ignorance and carelessness combined. If any great offence is committed against this law, death at once results; for, deprive a man of air altogether and he ceases to live. This is obvious enough. But if the offence is committed in a lesser degree—if a man breathes bad air or too little air, he does not die at once, but he gradually sickens, gets weaker, and dies in a day, a week, a month, a year or two, or perhaps more, from the effects of the imperceptible poison he is inhaling. The following succinct account of one of the most notable instances on record of the effects of an insufficient supply of fresh air ought to teach us its true value, which its abundance often causes us to forget:—On the 21st June, 1756, in Calcutta, on a close and sultry night, at eight o'clock in the evening, 146 human beings, the majority being Europeans, were placed in a dungeon eighteen feet by fourteen. There were only two small windows looking to the west. In a few minutes every prisoner fell into a

profuse perspiration, causing great thirst. Before nine o'clock every one's thirst was intolerable, and their breathing difficult. Before eleven o'clock one-third were dead; by half-past eleven most of the living were raving. At six o'clock the next morning the prison was opened; only 33 out of 146 were alive. The windows were not large enough to admit fresh air, or to give outlet to the poisonous atmosphere created by so many breaths. Had there been a fire-place opposite to the window, or any aperture to let out the poisoned air, the catastrophe would have been probably avoided.

The tortures deliberately inflicted by ruthless men are dreadful enough to contemplate, but when a similar catastrophe is brought about with the best possible intentions, owing its occurrence altogether to a profound ignorance of the merest rudiments of sanitary science, the sensation excited is one of mingled horror and indignation; indignation, that a person to whose care many human lives were trusted, who was allowed to take this most serious and heavy responsibility, could be permitted to command a vessel, without any previous test of his knowledge on one of the most vital points concerning the health and lives of his passengers and crew. The case alluded to is that of the steamship *Londonderry*. She sailed from Sligo on December 2nd 1848, for Liverpool, with 200 steerage passengers on board. The weather becoming very stormy, the ignorant commander determined to batten down the hatches. With this purpose he ordered the steerage passengers to retire to their cabin, and they were consequently forced into this apartment, which measured eighteen feet by eleven, and was only seven feet high. The hatches were then battened down, despite their cries and struggles, and covered over securely with tarpaulin. The scene that followed is too dreadful for description. Out of two hundred poor creatures thus thrust living into the grave, in an incredibly short space of time eighty-two were dead, with every circumstance of horror that could surround such a death—violent convul-

sions, and bleeding from the eyes and ears, in many cases preceding dissolution.

These are extreme cases, no doubt, but they suffice to point out very forcibly what insufficient or bad air can do. The following extract from the work of Dr. Coombe affords another illustration, which, if not so striking, is perhaps of more importance to our present purpose, as it shows the dreadful fate that individuals may inflict on themselves from ignorance and carelessness in this most important matter:—"In the preceding editions of this work I mentioned another instructive instance of the dangers arising from thus excluding even the simplest notions of physiology from common education. It was that of the death of two young men on board of the *Magnus Troil*, in Leith harbour, in March, 1833, arising from suffocation. They had gone to bed in the cabin as usual, but had shut the door so closely on account of the cold that they were found in the morning, the one dead, and the other dying from mere want of air. Since that time I have read in the newspapers of the day accounts of six accidents precisely similar in every particular. The two last, in which two fine young men also perished, happened in the cabin of the sloop *Mary Hardie*, lying in Greenock harbour, in November, 1840, from which it is inferred that such occurrences are by no means infrequent."

Accidents like those, though they do certainly occur still from time to time, have of late years become comparatively rare.

If we now turn to consider shortly the composition of atmospheric air, we will be better able to appreciate its various actions on the animate bodies and plants constantly submitted to its influence.

It is mainly composed of two gases, oxygen and nitrogen, in the proportion, speaking roughly, of one part of the former to four of the latter gas. There is also another gas entering into its composition called carbonic acid—a gas of a most deadly nature. It is fortunately present in very small quantity only in ordinary atmospheric air, but as we

shall hereafter notice, this quantity is very dangerously increased in certain unhealthy localities. This gas is not peculiar to the air, as it is given out in large quantities by the lungs, and is supposed to be the main cause of death in the cases of wholesale suffocation already detailed. It is, therefore, one of the dangers of crowded assemblies. It is also produced by fermentation, and we occasionally read of the sudden deaths of brewers' men from their incautiously descending into vats before all this gas has been removed. It is readily rendered harmless by slaked lime. Breathing it largely diluted, or in very small quantity, causes a sensation as if the whole back of the throat was suddenly pricked with innumerable pins or needles. The taste is familiar, and not unpleasant in soda water, where it escapes during effervescence. It issues in some places from clefts in the earth's surface, and there is a well-known cave in Italy where it is given out in this way. Being considerably heavier than the air, it may be said to love the ground, and it does not rise more than twelve or fourteen inches from the surface. One very curious effect of this, and from which the cave takes its name, is that a man may walk in in safety; but if he is followed by his dog, the poor animal at once drops dead, his head being near or below the level of the poison.

The large quantity of carbonic acid given out in all these different ways, would seem, at first sight, to threaten all animal life with destruction; our safety is found, however, in the growing plants, which absorb this gas as their natural food. This is the reason why in confined spaces which are inhabited, as artisans' rooms in tenement houses, the practice of window gardening is so beneficial. The quantity of carbonic acid given out by the lungs of several people massed together in a narrow space, is so large, and soon renders the atmosphere so impure, that it is of great consequence that they should have some means of getting rid of it, particularly at night in winter, when the coldness of the weather induces the close shutting of all doors and windows.

The fourth constituent of atmospheric air is watery vapour, of which it always contains more or less. It is raised from the surface of seas, lakes, and rivers by the sun's heat. This it gives back to the earth as rain, and the atmosphere is thus cleansed of its floating impurities periodically. These floating impurities are almost always to be found in air, and, indeed, may be seen any fine day as motes in a sunbeam. These motes are very various in their composition, according to their situation. They are mainly particles of dust of different kinds. They are great sources of danger in steel and iron works, where they consist of small particles of metal, which, being inhaled, produce fatal lung disease. In coal mines also, an analogous disease, which is not altogether so fatal, is produced by the floating particles of coal dust. Professor Tyndall, of late years, has greatly increased our knowledge with reference to this subject, and has devised and performed some beautiful and valuable experiments in illustrating it.

An interesting instance of one of Nature's provisions for avoiding dangers like these, to which in modern life our lungs are so continually exposed, may be here noted. The air rushing in through the lungs at each inhalation can pass freely through the larger air tubes, but when by-and-by it enters the small transparent canals which lead into the crystal air cell, the waving arms of countless cilia stretch from the sides of the passage to arrest and thrust back any accidental floating impurity. They allow the air itself to enter the little cavern, where the black and sluggish tide of used-up blood is waiting to be transformed by its contact into the brilliant scarlet stream which straightway flows to the heart, bearing with it the life-giving oxygen to renovate and heat the entire system. The remaining nitrogen, having taken up its load of carbonic acid and organic impurity, is now helped forward on its outward journey to the atmosphere, by those same delicate arms which before hindered the entrance of the offending particle.

The air is also polluted most seriously by permitting

animals to be slaughtered within the limits of a town or city. In the localities in which it is done, the ground naturally becomes sodden through with blood and other matters which rapidly putrify. There is always plenty of damp about such places, and thus countless organic particles are being constantly raised from the ground by evaporation, and floated into the general atmosphere, where their presence is most injurious to the health of the inhabitants. It is absurd, in the present age of tram-cars, railways, and rapid locomotion, to permit any extensive slaughtering to be done within the city boundary. In London and several great continental cities, it is found practicable and convenient to have it done outside, and it is a reproach to our common sense, that we do not make the imitation of the good example compulsory on all cities and towns within the kingdom. All bone-boiling and other similar manufactories for the utilisation of animal products could be subjected to the same law without inconvenience, and it is to be noted particularly that those trades are by no means harmless even where no bad smell is experienced. If the little particles are very largely diluted by atmospheric air, the smell may be so trifling as to be altogether unnoticed, or it may be even entirely absent. This, however, does not prevent the poisonous anima particles from being breathed and swallowed, and though their reception into the body in this way may not produce any immediate acute attack of illness, which if breathed in a concentrated form they would be likely to give rise to, still they gradually and slowly undermine the health, and render those suffering from their baneful influence liable to succumb readily on the invasion of any serious disease.

The gases allowed to escape into the air from untrapped sewers are also highly dangerous. Perhaps the most frequent of these is sulphuretted hydrogen, but sulphide of ammonium and nitrogen are also present, in addition to carbonic acid, to which we have before alluded. These gases are most destructive, not alone to health, but to life itself, if breathed in a concentrated form. The newspapers

record from time to time the sudden deaths of labourers employed to clean out sewers from this cause, and though it has been a matter of dispute whether men employed in sewer-cleansing suffered ill-health from breathing them in a largely diluted state, there can be no doubt they often produce attacks of illness in other people. A police-sergeant in London, some years ago, pointed out to the writer an open sewer, the emanations from which, as he passed it, had made him ill, and had caused similar attacks in his predecessors on the same beat.

The deadly effects of sulphuretted hydrogen, even when diluted, are well shown in the following experiment of Dr. Barker's: "A dog was placed in an atmosphere containing two parts of the gas to one thousand parts of ordinary air. Within a minute he fell on his side, and was seized with tremors; the action of the heart became irregular, and within four minutes the respiration had apparently ceased. It returned, however, and became very rapid. He was exposed one hour and forty-eight minutes. He next became universally cold, jerking of his muscles followed, and he died eight hours after removal." Thus, even when removed from the influence of the poisoned air, he had not sufficient strength to rally, his blood no doubt having been overloaded with more poison than it could get rid of in time to save his life. The same effects are produced by other varieties of poisoned air—for instance, many of the poor people who were taken alive out of the black hole in Calcutta afterwards died of putrid fever.

It is satisfactory to reflect, however, that if air is sometimes the vehicle of poison, it is also the medium through which the healing effect of many valuable medical particles are applied to the frame. The salt in the sea air is a well known instance. The air at Arcachon has been considered a healthful inhalation for diseased lungs, from the little particles of fine resin it contains, derived from the woods that surround that delightful health resort.

Amongst the more general effects of air we may consider its mechanical actions, and in this view, the shape, symmetry,

and beauty of all organic beings depend to a great extent upon it. The height to which the atmosphere extends from the earth's surface being estimated to be forty-five miles, there is consequently an amount of pressure exercised, constantly and continually, on every square inch of our bodies, equal to fifteen pounds weight avoirdupoise. Its effects in diffusing and tempering the sun's rays may be merely alluded to, and its rarefaction by the sun's heat causes the winds and aerial currents. The production of sound depends upon its vibrations, and experiments have been made to show, that where air is absent, sound cannot be produced. The most familiar of these is, perhaps, the bell rung in vacuum—in other words, under a glass from which all air is excluded—when the tongue is seen to strike the metal briskly, and yet there is not even the faintest sound perceptible.

If we wish to consider for a moment the united phenomena of silence and life presented on a vast scale, the deep sea affords a very fine example. In these almost unfathomable depths there is another world, rivalling ours in vastness, and approaching it in variety and beauty. It has its caverns of coral, its lofty mountain ranges, its trackless sandy plains, its waving forests of green and brown and yellow, all full of life, of motion, and activity, peopled with countless myriads of inhabitants different in size and shape and colour, fulfilling with ceaseless perseverance the functions destined for them by their Creator. Here the flashing armour of the swift pursuer glances and is gone, as with incredible speed he darts with a gliding motion on his prey. There, perhaps, two monsters of gigantic size and strength engage in deadly combat, and yet not a sound breaks the eternal stillness. The storm that agitates the distant surface is unheard and strikes but a very little way beneath it.

It may be stated, with considerable confidence, that all occasional and accidental impurities of air do far less mischief to the public health than the continual mismanagement of its use common in all classes of society, by which it is

rendered unfit to support a healthy life. Now, there are two ways by which air may be rendered thus comparatively valueless, either by excluding it too much from one's dwelling—and this is the fault of the rich; or by crowding too many people together in small rooms—and this is the fault of the poor. In the houses of the better classes the air is kept out by closed windows, doors, curtains, and even in some cases by putting screens before the fire-places in summer, and in bedrooms in winter, when fire is not used, thus cutting off the escape of air which is used up by breathing and making the room feel stuffy. There is no more fertile source of that scourge of modern life, consumption, than rebreathed air—that is, breathing our own breath or the breath of another. This can never happen if there is fresh air in a room, because the expired air, loaded with moisture and organic impurities, is hotter than the surrounding atmosphere, and tends in consequence to ascend above the breathing level, and thus becomes harmless. How often does it happen that families are plunged into the deepest grief for the loss of perhaps the best loved amongst them, and all through the neglect of the simple precaution of breathing fresh air. The poor sleep several in a room together, and this unfortunately is an evil it is difficult to remedy; but a great deal may be done by keeping the place dry and clean, and always having a little of the window open at the top, night and day.

It ought to be remembered that there is an occasional constituent of the atmosphere termed ozone, which is found in great abundance in open places, as at the sea-side, in the country fields, and even in the centre of large squares in cities, but it is never found in crowded places, as ill-ventilated bed-rooms, or the crowded forecastle of ships. This explains the reason why consumption, from which disease it might be thought sailors would be entirely free, is so common in the merchant navy. They sleep in such a wretched atmosphere, loaded with the organic impurities and the carbonic acid of their own breaths that all

the fresh air they breathe during their hours of duty is insufficient to save them from the consequences.

Ozone seems to be merely some modification of oxygen, commonly generated by electricity. It is found most plentifully after electric disturbances in the atmosphere. Its absence wherever organic impurity or decaying animal matter exists shows it is at once absorbed, and it is therefore a valuable constituent of some disinfectants in common use.

If we now consider the influence of different levels on the air, we shall find its situation has considerable influence in altering its qualities, quite irrespective of its composition or its impurities. Mountain air, for instance, is much less dense than the air of plains, the atmospheric pressure becoming less as we ascend. The simple expedient of boiling water at different points during the ascent of a mountain proves this very sufficiently. For instance, on the sea-level, water boils at a temperature of 212°, but at the summit of Mont Blanc it only requires to be heated to 182°, so much less resistance does the atmosphere of the mountain top oppose to its expansion. It is of considerable use in this way in determining the height of different points on the earth's surface. The effect of mountain air on invalids is often restorative in a high degree, while its bracing character gives an increased sense of enjoyment to the healthy and strong. The effect of a mere change of air from one point to another, in stopping some forms of spasmodic cough, may also be mentioned.

The changes which continually take place in the atmosphere have, no doubt, some influence on the public health, though its degree and nature have not as yet been sufficiently investigated and explained to lead to any practical results. This study, which belongs more particularly to meteorologists, will no doubt hereafter, when more generally pursued, throw light on many questions of deep interest, particularly in relation to the cause and spread of epidemics. Ruskin thus alludes to it in a paper published in the "Transactions of the Meteorological Society":

"It is a science of the pure air and the bright heaven; its thoughts are amidst the loveliness of creation; it leads the mind as well as the eye to the morning mist, and the noon-day glory, and the twilight cloud—to the purple peace of the mountain heaven, to the cloudy repose of the green valley; now expatiating in the silence of storm-less ether, now on the rushing wings of the wind. It is, indeed, a knowledge which must be felt to be in its very essence full of the soul of the beautiful. For its interest it is universal; unabated in every place and in all time. He whose kingdom is the heaven can never meet with an uninteresting space—can never exhaust the phenomena of an hour; he is in a realm of perpetual change—of eternal motion—of infinite mystery. Light and darkness, and cold and heat, are to him as friends of familiar countenance, but of infinite variety of conversation; and while the geologist yearns for the mountain, the botanist for the field, and the mathematician for the study, the meteorologist, like a spirit of a higher order than any, rejoices in the kingdoms of the air. But as we before said, it is neither for its interest nor for its beauty that we recommend the study of meteorology. It involves questions of the highest practical importance, and the solution of which will be productive of the most substantial benefit to those classes who can least comprehend the speculations from which these advantages are derived. Let it not be supposed that this is a chimerical imagination—the vain dream of a few philosophical enthusiasts. It is co-operation which we now come forward to request, in full confidence that, if our efforts are met with a zeal worthy of the cause, our associates will be astonished individually by the result of their labours in a body. Let none be discouraged because they are alone or far distant from their associates. What was formerly weakness will now have become strength. Let the pastor of the Alps observe the variation of his mountain winds; let the voyagers send us notice of the changes on the surface of the sea; let the solitary dweller in the American

prairie observe the passages of the storms and the variations of the climate; and each, who alone would have been powerless, will find himself a part of one mighty mind—a ray of light entering into one vast eye—a member of a multitudinous power, contributing to the knowledge and aiding the efforts which will be capable of solving the most deeply hidden problems of Nature, penetrating into the most occult causes, and reducing to principle and order the vast multitude of beautiful and wonderful phenomena, by which the wisdom and benevolence of the Supreme Deity regulates the course of the times and the seasons, robes the globe with verdure and fruitfulness, and adapts it to administer to the wants and contribute to the felicity of the innumerable tribes of animated existence."

Pure air, then, is the most important of all health factors. When it is breathed freely, plentifully, and continually, there are few diseases it will not enable the body to resist. Nay, even severe injuries, which, received by the denizen of the overcrowded city, would be speedily followed by death, will be readily recovered from by the agricultural labourer or country farmer, who, always breathing a pure atmosphere, has thus stored up a great amount of additional constitutional force. It ought to be remembered, that no matter how poor the food is, if plenty of fresh air and cleanliness can be attained the health and strength will be good; but if fresh air and cleanliness be absent, no amount of good food and clothing will prevent sickness and death. The British army, for instance, is about as well-fed and well-clothed an army as there is in the world. The men get meat every day for dinner, a good breakfast and supper, regular exercise, and are not overworked; yet Dr. Farr stated before the British Association, that in 1857, owing to the crowding in barracks, bad ventilation, bad drainage, and want of cleanliness, the mortality of the British army was 17 per 1,000. Three years later, when the laws of health, being better understood, were put in force, the mortality fell to 8 per 1,000. Thus (in the

words of Dr. Farr), "a great result has been realised. In England hundreds of lives have been saved—indeed, a battalion living in arms at the end of 1859 would, at the previous rate, have then lain buried in their graves. Severe sickness has also decreased, and the vigour of the whole body of healthier men has no doubt increased in proportion."

We have not touched upon the different effects of air at different temperatures, as that would lead us beyond the limits of our present purpose; but we cannot conclude without noticing the beautiful provision in Nature which lessens our risk in winter from the rain shower—a risk by no means insignificant, for from an accidental wetting many a fatal malady has originated. The coldness of the air in that season so lessens evaporation, that the temperature of the body thus wetted is not lowered rapidly, as it would be in summer under similar circumstances.

We will end this paper with the following practical recommendations:—1st. Never sleep in a room without a fire-place. 2nd. Never stop up a fire-place, winter or summer. 3rd. Always leave about two inches of the bedroom window open at night — at the top—if that be possible.

LECTURE III.

SANITARY SCIENCE IN THE SICK ROOM.

"In the same manner as beasts of prey and venomous and offensive reptiles lose their ferocity, or recede in all parts of the earth, and finally disappear before the advancing civilisation of mankind, so, also, it would seem, do the diseases which prey on health and life become modified by the resources of man's ingenuity, or disappear before his discoveries and growing wisdom."—*Connolly on the Principles of Practical Medicine.*

IT is interesting to note how, in almost every age, disease or sickness attacking mankind has been always regarded as an entity, as an individual enemy or evil angel, and the patient has been almost invariably spoken of as struggling with disease as with a foe whom he might possibly conquer or overthrow. This view, which in earlier times must have appeared in a high degree fanciful and imaginative, has undoubtedly gained in importance by the later discoveries of science. Modern research is steadily tending in the direction of discovering the absolute germs of many forms of disease which, by entrance into the body, either in the air, or the food, or the water, act as an enemy, and call forth all its opposing forces. That the disease-producing poison does enter the body in some of these ways has, in the case of certain diseases—notably typhoid fever—been ascertained beyond the possibility of doubt. That it enters and spreads from place to place and patient to patient in many other diseases is highly probable, indeed, all but established. What the germs are, their shape, size, distinct mode of action, power of selecting one part of the body in one disease and another in a different one, are all points still to be determined.

It is, however, something to know that it is not anything in the body itself—any small piece of delicate machinery of structure and operation, so subtle as to elude human faculties—that has gone wrong, an accident that human ingenuity is powerless to control or avert. There is hope in the fact that we can prevent the entry of the enemy by certain precautions, which being explained and described, form what is called sanitary science. This is usually looked upon as relating almost solely to the healthy portion of the population, and consequently the view which we propose to take of it here has been frequently neglected or overlooked. It is for the most part as it affects the individual or the family, we propose to consider it, for, while sanitary science, as State medicine, deals with large sections, or even with the whole population of a kingdom, and extends its operations over great cities, sanitary science, as we limit it, in this place, deals only with the sick-room.

Important as fresh air is to healthy persons, to the sick it is tenfold more so. The healthy man poisons the air he breathes and requires always a fresh supply, but during sickness, the disorganisation or decay which is always going on is very much increased in rapidity, and consequently a much greater number of poisonous or decaying particles are given out with each expiration, and if the ventilation is imperfect the air rapidly becomes poisonous. An idea may be formed of the properties of such air when it is stated that a ward in a Paris hospital, which had been occupied by patients suffering from an infectious disease, where the processes of disorganisation were very rapid, became so saturated—both its walls and floor—with the poisonous breath particles, that each new patient that went into it, even after it was subjected to a thorough cleaning, took the disease; and it was not until after the plaster was absolutely scraped from the walls that it became once again safely habitable. It will be seen from this that a patient going through an illness in an ill-ventilated apartment, runs an appalling risk of being poisoned by his own breath, without for a moment considering his danger from whatever disease

he may be labouring under. It is apparent also that his chances of recovery may be enormously increased if he can be supplied with an abundance of fresh air.

This is proved very clearly by the difference in the mortality of different field-hospitals attached to the French and German armies during the Franco-Prussian war. In hospitals formed of houses or other buildings, seized for the purpose, the mortality was from forty to fifty per cent. and even higher; and, on the other hand, where mere tents were used, open at all sides to the air, with merely a screen for each patient on the side the wind happened to be blowing, the mortality was only five per cent., and sometimes even lower. Another example of the advantages of thorough ventilation was presented by the castles hospitals at Balaclava during the Crimean war. They were ventilated at the ridges by opposite windows, and at both ends, and their mortality was only three per cent. out of 1,830 admissions, which must have been to a great extent serious cases, for they were close on the battle-fields.

It would appear from this that a bountiful supply of fresh air being a sovereign remedy for illness, it would be a simple matter to throw open doors and windows without stint, and thus cure the patient without very much trouble; but here we meet with a practical difficulty, which forms the main hindrance to the proper ventilation of sick rooms. When the body is weakened by any illness it is very liable to local congestions, mostly internal, and these congestions are often highly dangerous, and unfortunately they are readily produced by a draught of cold air. The difficulty, then, is to have plenty of air without any draught. To attain this object a great many plans have been proposed. It will be only necessary to consider one, which, besides being sufficiently effective, is applicable to a room of any size where there is a fireplace. It is necessary, in the first place, to carry it out effectually, to keep a small fire brilliantly burning in the grate, night and day. This will act as a powerful sucker, and draw in constantly all the vitiated or used air, carrying it off through the chimney. The next

thing is to supply its place with pure air. To do this, pull down the window four inches from the top and close up the aperture thus made with strong pasteboard or zinc sheeting, tacking it closely and evenly along the window sash. Having done this, bend it out at the top for about four inches, and fill the space thus left at either end with a triangular piece of zinc or pasteboard. The air by this arrangement can only come into the room in a direction from below upward. It consequently strikes first on the ceiling, and is thence gradually dispersed through the room without draught.

As valuable aids to ventilation and consequent atmospheric purity, disinfectants may be here referred to. The most convenient, perhaps, for general use is, Condy's fluid. A basin containing a solution of it, in the proportion of one wine-glassful to a quart of water, should stand near the door of the sick-room, and in this should be left a feather whisk. Every time anyone enters or leaves the apartment they should sprinkle a little all round the floor as they pass; this simple practice renders the air pure and sweet. There should be neither curtains, carpets, nor superfluous furniture in the sick-room. The floor should be painted or waxed, and if a rug or two be found necessary they should be placed at some distance from the bed. Everything in the nature of slops, &c., coming from the sick-room should be received in a covered vessel containing Condy's fluid or carbolic acid. All soiled clothes or used towels should be at once immersed in a solution of Condy's fluid, in the proportion of a wine-glassful to a gallon. The clothes will not be injured in the least by the process if they are afterwards simply rinsed in cold water, and the danger of infection will be destroyed. Many poor laundresses have lost their lives by washing the clothes of persons ill of infectious disease, and therefore this simple and life-saving precaution should never be omitted. One case may be related in illustration. A young gentleman suffered from a mild attack of small-pox, so mild indeed that he could be hardly said to have been very ill at any time, and the marks left

are so slight as to be quite imperceptible to a casual observer. The laundress, however, a poor widow with a family, of which she was the sole support, while washing the clothes he had worn during his illness fell ill of the disease. It unfortunately assumed a malignant form, and she died after a few days' illness, leaving her family a burden on the rates, and thus entailing the expenditure of a large sum of public money by the neglect of a simple and inexpensive sanitary precaution.

Another case illustrative of the great care necessary in washing the clothes of persons labouring under infectious disease may be here mentioned, as it is both striking and instructive: For years, at the Children's Hospital at Birmingham, scarlet fever was exceedingly rare. "Amongst 500 children passing through the wards in a year, the occurrence of scarlet fever was not more frequent than in the same number of children out of the hospital. The clothes were washed outside, one laundress taking the linen from the contagious, and another from the non-contagious division of the hospital. In the beginning of 1870 the children were removed to a new building, and very soon the medical officers were alarmed at the frequency with which scarlet fever appeared. As the year advanced the evil increased, and from the end of July to the end of September no less than ten cases occurred, and several cases of operation were followed by scarlet fever. On investigation the following facts were made out: The washing which had been formerly done outside was now done in a laundry behind the centre block of the hospital, and the drying yard is immediately behind wards 1 and 5, in which eight of the ten cases occurred. The other two cases were in an adjoining ward to No. 5. The linen from the contagious section of the hospital was taken to a tub in the garden, in which was placed some Condy's fluid. The foul linen was from time to time taken to the laundry, where it was washed on a different day from the linen taken from the non-contagious division of the hospital. Possibly, however, the separation of the clothing of the two

divisions was less complete in practice than had been intended. Struck by the fact of the freedom from scarlet fever in the old hospital, where the clothes were washed outside, and its prevalence in the new hospital, where a different practice prevailed, the medical officers ordered that the contagious clothes should be sent to a laundress who took in no other washing." This was done on the 28th of September, and from that time to the date of the paper (November 22nd), no other case occurred.

The air immediately about the patient can be kept pure by suspending a very simple amulet over the bed, allowing it to hang in mid-air four or five feet above the level of the coverlet. It is simply made by piercing several holes in the lid and bottom of an apothecary's ordinary willow-box, in which twenty grains of pure iodine have been previously placed. In a case of fever, scarlatina, or. small-pox, it would be well to have a sheet wrung out of a solution of Condy's fluid, of the strength last mentioned, and suspended as a curtain in the doorway of the sick room, particularly where the other residents must still continue to inhabit the house.

We have already spoken of the countless floating particles of decaying matter present in the air of a sick-room, and there is a very important precaution to be observed, bearing that fact in mind, with regard to the food and drink of the patient: it is this, that neither food nor drink, except at the moment of using, should ever be left uncovered in a sick room, and this also includes water. Should this precaution be neglected there would be a manifest danger of the patient reimbibing the poison he had already got rid of, in illustration of which we may mention the following curious circumstance related by Professor Champouillon, of the Val-de-Grace: "In 1852 two regiments (the 19th Light Infantry and the 44th of the Line), were barracked at Neuilly, in Paris. During the month of August the first regiment was attacked by a grave form of dysentery, while the other regiment had only a few cases of diarrhœa. The water was the same—viz.,

drawn from the canal de L'Ourcq, which is known to be very impure, and a hasty observer might have therefore excluded all idea of the water being the cause, but Champouillon discovered that the two regiments had different modes of dealing with the water. The 19th added brandy to it, and it was noted that this caused it soon to become putrid *if the water vessels were allowed to remain in the barrack-rooms.* The spirit, in fact, precipitated the organic matter on the sides and bottom of the vessels, and it there soon putrified and made each vessel 'a little movable marsh.' The other regiment took their water either as coffee or mixed with red wine, the tannin of which prevented putrefaction. Red wine being substituted for brandy, the 19th Regiment soon became free from dysentery."

The practice of keeping the glasses the patient drinks from, immersed in clean cold water in a covered vessel, and thus preserving them from all contact with the room atmosphere, is therefore an excellent one.

With regard to the bed and bed-clothes, it may be stated generally that a hair or spring mattress is much preferable to a feather bed, inasmuch as a level surface is always more resting to the body which is forced to remain for days reclining, as it distributes pressure more evenly, and is thus less fatiguing to the weakened muscles. There is one point in reference to the bed-clothes which should never be overlooked, and that is, the importance of having a clean dry surface always applied to the patient's skin. In all fevers or acute diseases the sheets should be changed at least twice daily, and in every case of illness extending over three days, of what nature soever, the sheets should be changed once daily, at night. This by no means renders it necessary to wash them on each occasion. It is merely necessary to ventilate them thoroughly by spreading them out in the open air, or hanging them in an empty open garret for twelve hours, and then airing them before a brisk fire. The air disinfects them very completely, and the fire finishes what it begun. So great importance did the illus-

trious Graves attach to this precaution, that in fever cases, wherever it was possible, he had two beds in the room, and, had the patient moved from one to the other every day. The pleasurable sensation given by the new bed or new sheets to the skin is a real, and what is better, a serviceable luxury to all sick people.

With reference to the arrangement of the room, it should be always borne in mind that sickness is very depressing, and that every means which has a tendency to render it less so should be sedulously had recourse to. Thus, a neat appearance of the room, a few flowers on a table in sight of the bed, and above all, a cheerful hopeful countenance in the nurses and attendants, may often be of incalculable value. The amount of talking allowed will of course be regulated by the physician where it is necessary, but there should be no whispering in the room. If there is anything the patient should not hear, let it be said outside, but on no account should there be any whispering allowed. It is inexpressibly irritating to a sick person, and is often the source of many groundless alarms, and sometimes of real danger. Rustling dresses and creaking boots should be also avoided.

In most long illnesses it will be very serviceable to fill up the patient's time, so that without being exactly conscious of it, the day may be broken up for him into short intervals, and thus a good deal of the tedium of sickness removed. The most obvious method of doing this is the regulation of the meals in such a manner as to fulfil the desired object. Meals (subject always to the physician's directions) should be taken as far as possible at the same hour as was customary to him in health; and as they are in most cases very small in quantity, it is probable some additional nourishment will be ordered to be taken in the intervals between them. Now, the point that it is of importance to observe is, that these intervals should at all times be regular. The patient should get the arrow-root soup, wine, or whatever it may be, at precisely the same, hour every day. Thus he will always have something to

look forward to not longer away than two hours. Another reason why this should be observed is, that the human system is very liable to be influenced by habit—for example, if one is accustomed to retire to rest every night at eleven o'clock, when that hour arrives drowsiness supervenes, and if from some accidental circumstance, sleep has been taken during the day, even then the habit asserts itself, and the desire to sleep manifests itself as if no sleep had been taken previously. The same circumstance is observed to occur with regard to meals. If dinner is taken habitually at, say five o'clock in the afternoon, and that it happens on an occasion a substantial lunch is partaken of at two o'clock, nevertheless the sensation of hunger recurs at four o'clock, as if nothing had been eaten, Now, this is a very valuable fact in illness, for by keeping to the same hour for three or four days, if even only one teaspoonful of nourishment is taken at each hour, a habit is established, and the system often is so favourably influenced by it, that much more nourishment is both taken and assimilated than would otherwise be the case. Sponging the face and hands gently with lukewarm water, and drying carefully on a soft towel after each meal, is also a very refreshing and beneficial practice.

There is, however, another part of the patient's treatment which in a large number of cases has an influence of incalculable importance on the final result; we allude to the mental, or moral portion. Illness is, as a rule, the result of some violation of the physical law. Until this is set right we can hope for no improvement, but immense aid will be given in the effort to set it right if the patient is fully impressed with the truth and value of the moral laws as well, and is acting up to them. They are so closely connected that it is impossible to disassociate them or treat of one without the other. Now, one of the great results of a perfect observance of the moral law is a quiet, contented mind, and here at once we have a powerful help towards curing the disease, for, after all, the brain is an organ of the body as well as the seat of the

intellect. The nerve that presides over the process of digestion, for instance, comes directly from it, and the hidden silent brain-cell, that in its glistening inmost recesses conceals a thought, is close to the cells that supply the nervous force to the stomach, and, surrounded by them on every side, is utterly undistinguishable from them. If, then, one cell is disturbed, can we suppose its neighbour will be unaffected? Obedience to the moral law is required to render obedience to the physical law perfect, and in some severe illnesses, even possible. This, then, is a point that in any dangerous disease should never be lost sight of. Sickly sentimentality may suggest that it is bad to make the patient anxious, that his danger ought to be carefully concealed. This is altogether a mistake. His danger is well known to him, he feels it, he sees it in the eyes, knows it in the touch of his nurses and physicians. Nay, he may be anxious that some one should say to him what he is afraid —from perhaps a feeling of disinclination to meeting evil half-way—to speak of himself. In the large majority of cases it is better on every account, that both temporal and spiritual concerns should be attended to early in any disease. The weight that is taken off the patient's mind by arranging his affairs and conferring with his spiritual physician, is so great, that it often has a distinctly marked influence for good on his symptoms. It certainly affords an additional aid of great power, and it should be always taken advantage of. When everything has been thus provided for it may be hoped that victory will be, as it usually is, the result of prudent foresight, calmness in danger, and a courageous resistance; and though the fortress may be sorely pressed and the enemy powerful and fierce, still, when the supplies are good, and discipline is preserved, the surrender of a fortress is a rare occurrence.

Here it may be well to say a word concerning the physician in attendance. He is, after all, the proper judge of the circumstances of each case; and it would be the sheerest folly to do anything but obey him exactly and implicitly None of the advice here written should be

acted on other than with his approval and sanction. In every case there is a difference in detail. No general rules applicable to all, or even a large fraction of cases, can be laid down, and as—to revert to the figure of a besieged fortress—nothing but ruin and disaster could come of disobedience to the general conducting the defence, so difficulty, danger, and probably defeat, would be the result of disobeying the doctor. It may be said, further, that in every siege there is some particular hour in the twenty-four that the enemy usually chooses to make his most vigorous assaults—his most desperate onslaughts. In sickness, the small hours of the morning—from two to three and four o'clock, when candles and lamps are burning low, and nurses are nodding—is the time in a large number of dangerous diseases when the fiercest attacks of the enemy occur. It would be well, therefore, to make that hour, in most cases, a period of nourishment and particular attention, and so at last, by strenuous perseverance, unwearied vigilance, sometimes high in hope, sometimes almost despairing, but at all times cautious, resolute, and above all, implicitly obedient to authority, the enemy, beaten off and disorganised, may raise the siege.

The safety of the patient being thus provided for, and the illness having terminated, the next consideration which demands our attention, in case the disease was of an infectious character, is the precautions necessary to be put in force to prevent the decaying particles of poisonous matter, thrown off during the progress of the disorder, from finding a soil for their further development, and a consequent spread of the malady—in other words, the safest and surest means of destroying the disease germs. This matter is of the first importance, for, in the words of Professor Tyndall, "As surely as the thistle was from a thistle seed, as surely as a fig comes from the fig, the grape from the grape, the thorn from the thorn, so surely does the typhoid virus increase and multiply into typhoid fever, the scarlatina virus into scarlet fever, the small-pox virus into small-pox; the thing which we call a virus is

to all intents and purposes a seed." A thousand illustrations might be given of the truth of this fact, and it is indeed surprising how a small article of clothing, even a neck-handkerchief, shall for months retain the poison. One well-known instance may be cited as an example: A family, several members of which had been attacked by scarlatina, after their recovery removed into another house, and all the clothes supposed to be infected were destroyed. It happened, unfortunately, that one small article was overlooked, namely, a little worsted muffler for the neck. This was thrust into an empty drawer and quite forgotten. Six months had elapsed, when a servant-maid opening this drawer found the muffler, put it on her neck, and within a week was attacked by scarlatina.

Now, all danger of a similar catastrophe may be avoided by causing all the clothing which will not bear washing, and all material to which wet would be unsuitable, as mattresses, &c., and which are too valuable to be destroyed, to be exposed to a dry heat of at least 240° in a hot-air chamber. This chamber is now in use, and has proved perfectly effective as a disinfectant in many cities and large towns, but every town and village ought to be provided with one. It need not be at all expensive, and there are several plans now by which it may be constructed simply enough, the particulars of which can be obtained, and most of the requisites furnished, from any large iron merchants.

It is not without interest to note that the power of heat in preventing or modifying putrefactive change was known and acted on in Africa by the savages many years ago. The following account of one such method of its application for this purpose occurs in Petherick's "Travels in Central Africa": "Three days' journey only south of this, on the death of an individual, they extract the intestines, heart, and lungs, and they are declared to be feasted on by the women only. Rolled up in a mat in a sitting posture, the mutilated corpse is placed on a wooden framework, some three feet from the ground, in the centre of the

hut. A constant fire of green wood in the first instance, to create as much smoke as possible, is placed underneath, and not until the obnoxious odours have ceased, and the body parched into a mummy by the joint effects of heat and smoke, is dry wood substituted. The hut does not cease to be inhabited by the family, and the deceased is not interred until twelve months after death."

As soon as the patient has left the room, the doors and windows should be closed, and the room fumigated by placing some sulphur on a pan with some live coals, the resulting vapour being permitted to circulate through the room and penetrate every corner of it for some hours. Then the doors and windows should be widely opened, and free ventilation thus kept up for some days. The wall-paper should be then mopped over with a solution of carbolic acid, in the proportion of a wine-glassful to each gallon of warm water, and when soft it should be all rubbed or torn down. The disinfecting process may be concluded by thoroughly scrubbing all the wood work, floors, windows, doors, panneling, and any furniture that may remain in the room, with carbolic soap and water. It would be well, if possible, that the room should remain uninhabited for a month or two, and before being again occupied it should be papered and painted.

With regard to the period at which the patient may be said to be quite free from the danger of personally infecting those with whom he may come in contact, no very definite rules can be laid down. It probably varies in different persons and constitutions, but it may be safely stated, that one clear month from the time of getting up, should be in all cases allowed, and this should be conjoined with the frequent use of baths and carbolic soap. It has happened within the experience of the writer that a patient who was out walking after typhus fever, meeting a friend, a fine healthy young man, sat down along with him for a chat. Within a week the young man fell ill, and died of a bad form of typhus, having been exposed to no other source of contagion. It may be also remarked, that stoop-

ing over the patient, or inhaling his breath, should be avoided. There are several cases on record where the person doing this was at once attacked by the fever without any premonitory symptoms. One such case has been recorded by the writer.*

The rules to be observed during convalescence are hardly of less importance than during illness. Fresh air is above all requisite, and when it is possible, change of air will be of service. Great attention should be paid to the skin at this time. It should be remembered, that its work is probably much increased during the period of convalescence in ridding the body of the poison of disease, and its functions in this respect should not be lost sight of. Bathing, and the flesh-glove, then, are even more necessary than at other times. As to the general treatment, the patient will, of course, continue to obey implicitly his medical attendant, and it may be here noted that many persons neglect to continue to correspond or consult their physician from an early period of their convalescence. There can be no more serious mistake than this. Many insidious diseases have their first origin with but very trifling indications of their commencement at this period, and escaping the serious notice of the patient; imperfect convalescence is the result, which may end in prolonged trouble. It would be always, then, an advisable precaution to pay a visit or two to the physician, even though the feeling of health has returned, and secure its perfect re-establishment before going back to the habits and cares of every day life. While a moderate degree of exercise will probably be allowed and enjoined as strength returns, over fatigue should be always carefully guarded against, remembering that in most infectious diseases the muscular system suffers, and is not able for prolonged exertion. Due caution should be also exercised with regard to mental occupations, much thought or serious reading being undoubtedly injurious. Temperance is also to be rigidly adhered to in both eating and drinking, and it ought to be borne in mind that there are many

* "Three Thousand Cases in Practical Medicine," *Dub. Journ. Med. Science*, September, 1873.

recorded cases where errors in this respect were followed by fatal relapses. Particular care should also be taken to preserve an equable temperature; and as the heat-producing power of the body always decreases during debility, it will be usually advisable to wear some extra clothing. This, however, should be warm rather than heavy, flannel being probably the lightest, as well as the warmest. Care should be taken not to sit down long when out walking, or in a draught, after exertion, as a chill is very easily taken. Plenty of repose will usually be needed; and besides ten hours at night, it may be well, at least, in the earlier periods of convalescence, to indulge in a daily siesta.

Thus progress will be made from day to day—the recollections of the sick-room, its alternating phases of gloom and weariness will gradually pass away, leaving behind them, let us hope, some useful lessons, which we can make available for both our moral and physical improvement; and the enemy which attacked us so fiercely may prove, after all, a friend in disguise. Though illness, pain, suffering, and danger are always repellant to our nature, though belonging to it, and may be avoided by every lawful means, still we may not inaptly remember, as Shakespeare expresses it, that "Sweet are the *uses* of adversity, which, though an ugly toad, yet doth bear a precious jewel in its crown." Mental and moral resuscitation have often dated from a severe illness; and there is no doubt that certain attacks of acute disease sometimes seem to have the effect of renewing or rejuvenating the constitution.

The delightful sensations of returning health will by-and-by merge into the assured feel of pristine strength regained; our old hopes and interests again attract us, and our intellect resumes its eager labours. The danger then arises of forgetfulness. Pleasure and novelty have charms that may place the fruits of our struggle in danger, but a short reflection will indeed convince us, that even at considerable sacrifice to inclination, we should resolutely strive to maintain the advantages of our hard-won victory in the sick-room.

LECTURE IV.

VENTILATION.

Wherever there is foul air, unrenewed air—impure air, for it comes to the same thing—there we meet consumption; there we meet scrofula and untimely death.—*MacCormac on Consumption.*

It is curious to observe how difficult it is to obtain belief for any truth, the acceptance of which would involve some self-denial on the part of him who receives it. It may be supported by the most convincing arguments—evidences of its reality may appear on all sides—examples, numerous and undeniable, may be brought forward in its proof; but if the truth, to be acknowledged, will entail any personal sacrifice, either of pride, or purse, or even of convenience, the best directed and most persevering efforts will often fail to secure its acceptance. On the other hand, it would be amusing, if the results were not so lamentable, to see with what eagerness any statement is believed which is favourable to self-love, interest, or runs in accordance with the passions and prejudices of mankind; and this, though the evidence in its favour be of the flimsiest and most superficial description—evidence which at once crumbles and disappears, when subjected to the test of impartial examination. These two peculiarities of the human mind are well illustrated in the position that the two important sanitary questions which we will presently examine hold in the general opinion to-day.

It has been again and again proved that breathing impure air is dangerous and destructive to health and life; yet, there is abundant evidence to show, that in workshops

of all kinds, male and female, counting-houses, offices, and even private dwellings, impure air still continues to be breathed, mainly because the alterations in structure necessary to secure good ventilation would entail some trouble and expense; while at the same time it is quietly assumed that tradesmen get drunk from some moral obliquity in their nature that is altogether incomprehensible, and, consequently, beyond the control of those responsible for their welfare.

The first sanitary question then, we will consider—which has for some time past been also a foremost social question—is the prevailing, and, as some say, increasing habit of drunkenness amongst tradesmen. The second is the present deficient construction of workrooms, in which workers of all descriptions are obliged to spend the hours devoted to their trades and employments. The first question has received a great deal of attention, even to the extent of new legislation. The second has, we may safely assert, scarcely been attended to at all, and yet the connection between the two is close and obvious, and, further still, the latter question is of the two the more important. It was stated in a previous lecture that there was a close relation and inter-dependence between the moral and physical laws. It is strongly illustrated here. The unfortunate tradesman passes his day in a close, ill-ventilated workshop, so constructed, that after it has been occupied half an hour, all its pure air has been defiled by the breaths of its occupants, and there is no sufficient means of getting a fresh supply. There is no great inconvenience felt by the persons in the room, as the air deteriorates very gradually, but to a person entering from the outer pure air, its depressing effect is perceptible enough. Now, we will suppose this tradesman is a young strong man, lately come up from the country to push his way in town. He is married, and has a couple of children; he is sober, industrious, and intelligent, determined to fight the battle of life as becomes a man, and to protect and provide for those whose happiness God has confided to him, if a strong arm and an honest

and faithful heart can do it. But he is compelled, from the circumstances in which he is placed, to violate daily that great physical law—"Breathe fresh air."

For the first year or two, or mayhap three, the resisting powers of a good constitution enable him to bear up against the evil, but by-and-by he does not find himself so strong as he was. At first it was his delight to take out his wife and little ones on Sunday to the parks, to enjoy, after his week's confinement in the city, the refreshing green of country. Now he finds the walk is too much for him, that he gets fagged with a very small exertion, and in the matter of carrying the children, his wife is the stronger of the two. On Monday he does not feel as if he could face his day's work. He mentions the matter to a brother workman, who immediately tells him he's a fool to be trying to do without drink; that the trade have found by universal experience it can't be done, and that he will lose his health if he does not take it. Pressed by lassitude, weary, spiritless, and dejected, he knows not what to do. He goes to the doctor. The medical verdict is short, but decided—"You want rest and fresh air; you are threatened with consumption otherwise." Poor fellow, rest and fresh air for him mean beggary and starvation. In an evil hour he takes the advice of his companion. He tries a dram. He feels the better for it; he eats better, he sleeps better. He declares the stimulant has saved him; "that he would have died had he not taken it." He is right. Yes, he is undoubtedly right. The proper vital stimulus, fresh air, being denied him, the artificial stimulus alcohol was necessary, and did him good; but, alas! like all artificial expedients, it only does good for a time, and a short time. The moderate allowance which he decides on at first, and which alone is consistent with health, is soon exceeded. He talks and associates with men whom he disliked and avoided before, but the drink has become a common bond between them now. The exciting pleasures of a tap-room meeting, soon give him a distaste for all calm domestic enjoyments, and little by little he becomes that

curse and disgrace of society—an habitual drunkard. Better for him had he died at once; better for his wife once so fondly loved, so proud of him, who now shrinks from his blows and drunken curses. Better, aye, better a thousand times, for his poor little innocent children. Better for them to swell the almost countless host of orphans that charity supports than to be demoralized by the example and degraded by the companionship of their unfortunate father. As for him, after a few years of misery, he succumbs to one of the numerous diseases that drink engenders, often repentant in his sober moments; sometimes making an effort to do better, but when indulgence in strong drinks becomes a confirmed habit, the intellectual faculties are powerless to control it. Physical restraint then becomes a necessity. Now, this man is a type of many; he was well brought up; he was not vicious in any one sense of the term; even in his most degraded state he remained morally pure.

The female worker, on the other hand, is often exposed to the same evil influence of a foul atmosphere. Her appetite fails under its baleful influence—her temper becomes irritable. They wonder at home what has changed her so. She longs for excitement to relieve her wretched sensations of depression and debility. She knows no quiet happiness; she has never enjoyed a day's health since she sat and worked in that poison-laden air. It sometimes unfortunately happens that the places of amusement she goes to, and the companions she meets there, are little suited to improve her mentally or morally.

And now we may enquire where the blame lies. A large class impute the fault to the tradesman, and the result is the early closing enactments; enactments which will no doubt act beneficially for a variety of reasons, but it is probable, nevertheless, that the verdict of every man who examines the subject impartially in the light of true science, will be that that legislation, however good and advisable in itself, is legislation begun at the wrong end. It deals with effects, and leaves the cause untouched. The

tradesman, to be sure, should not get drunk under any circumstances; he should abstain even from all intoxicating liquor, for fear of drinking habits growing upon him; but we have to deal with the ordinary run of mankind, and as long as bad and impure air is breathed, so long will stimulants be resorted to as a counteracting influence.

It is discouraging in the extreme to see with what slow steps sanitary legislation is advancing, and with all the boasted intelligence of the age it is to be feared buildings will still continue to be constructed capable of poisoning their occupants. In this matter a useful lesson may be taken from the church, whose Gothic temples, permitting such a great body of air in the interior, from their peculiar loftiness of structure, showed the triumph of Christian art over that of Pagan times, when the temples were low and flat-roofed, and must, when crowded, have been most unhealthy. But it is not alone the poor man who suffers from defective ventilation; even amongst the better classes there is frequently to be found the most deplorable ignorance of the laws of health. The following graphic picture of a rich man, suffering from a similar violation of the physical law, from the pen of the distinguished physician whose work on consumption has furnished the text for the present lecture, will be read with painful interest. He says: "I remember once seeing a gentleman; it was in one of the midland English counties. His voice was hollow, as were his cheeks, his eyes glistened with a preternatural fire, his finger ends were clubbed, else spent and emaciated; he expectorated great masses of matter without cease, his whole person was shrunk and attenuated, while he laboured under a continual chill, sure harbinger of the shadow of death. He was attired with the most careful precision; surrounded with every comfort apparently that wealth and solicitude could supply; he had needed but one thing, the absence of which destroyed him, as it had destroyed and was destroying myriads of others, and that was fresh air. The spectacle made an impression on me which I never could forget."

The evils thus detailed may, no doubt, have other causes as aids and aggravations besides deficient ventilation; but it is beyond dispute, that if we take two sets of men, treat them alike as to food, clothing and diet, but let one set have rather less air than the other, the effect on their health will be quite marked enough for all the practical purposes of our argument. This very experiment has been tried, and is thus described by Dr. Wilson in his lucid and able treatise on public health: "In one of the convict prisons, one half the prisoners are kept in separate confinement, except when at exercise; the other half are confined in their cells only during the night and when at meals. The cubic space and ventilating arrangements in the part of the prison occupied by the former were such, that the average ratio of carbonic acid, after a series of observations made at different hours of the night, was found to be ·120 per 1000 volumes; while in the part of the prison occupied by the latter, the cubic space was much smaller, and the average amount of carbonic acid was as high as 1·044 per 1000 volumes. The same number of observations were made in both parts of the prison at the same hours during the night time, so that a strictly fair comparison could be drawn. Now a careful inspection of the two classes of prisoners resulted in showing, that whereas the former were well nourished and healthy looking, the latter presented a somewhat less robust and more pallid appearance; and after eliminating every source of error, this difference in appearance could be only accounted for by the difference in the amount of impurities contained in the respired air of both parts of the prison."

Man often learns useful lessons from the lower animals, who now and then teach him some mechanical or economical secret which he would perhaps never have discovered without their aid. It would seem that the instinct given them by the Creator might be, perhaps, called an intellect, limited indeed, and different from the intellect of man, because, without man's glorious attribute, free will; but this deprivation, which at first sight might seem to lessen its

value, has quite an opposite effect—it in consequence remaining always fresh and untainted as it came from the hand of its Creator, unwarped by prejudice, or pride, or passion. Thus it is rendered certain and perfect in its operations, and unerring in its aims within its own narrow limits. The North American savage often perishes from want of knowledge how to build himself a proper dwelling, or from want of means or skill to procure his food, while the animals which some modern professors of pseudo-science, miscalled philosophers, would have us believe were his progenitors, whose gifts he has improved on, and whom he has left behind in the race of physical progression, are even now in these very respects his superiors. The beaver rivals the engineer of modern civilisation in the perfect construction of his dwelling and the security and strength of his miniature water-works, while the hawk strikes down his prey with a surer aim than the crack shot at a modern rifle-match.

If we glance, then, for a moment at the insect world we may observe, amongst the bees, a very perfect system of ventilation, carried out with admirable precision, and a very exact adaptation of means to the end. A bee-hive has its opening below on the level of its floor, and it is usually a small one. Through this opening all the air necessary for the breathing purposes of the hive must enter, as the whole interior, being coated over with a smooth soft waxy-substance, is air-tight. Now, so small an opening, unless a very violent wind was blowing directly on it, would by no means afford air sufficient; but the bees thus meet the difficulty. Inside the door, from night until morning, and from morning until night, a detachment of working-bees are stationed, who, by rapidly revolving their wings, use them as fans to suck in the air, and thus ventilate the building on the vacuum method. If, for the sake of experiment, some sulphur fumes, or other deleterious matter is mingled with the air, straightway another party is marched to the assistance of the one already on duty, and the vigorous flapping of their wings soon restores the

atmosphere to its wonted purity. The danger being over, the additional force retire; but the usual working party continues on duty until the next relief, and thus secures the sanitary safety of the little kingdom. If modern states followed the example of the bees in their care to provide their subjects with pure air, their citizens might attain as good a standard of health and strength as do those ceaseless workers of the hive, who seem—apart from their hours of repose—always vigorous and active, and never show signs, so common amongst men, of lowered vital tone.

The evil caused by deficient ventilation is not, however, limited to the production of a lower vital tone which often terminates in consumption; it may also give rise to acute disease of a contagious and often epidemic character. This has occurred over and over again in the tenement houses of the poor, particularly in seasons of want and scarcity. It was usually attributed, not alone to the deficient ventilation, but to the surface filth, intemperate habits, bad clothing, and poverty, which are usually the prevailing characteristics of such places. It is, therefore, of some interest to meet with a case where the production of fever was checked at once, and in a most striking manner, by simply improving the ventilation, for it may be safely assumed that no very material change could have been effected in the diet, clothing, or habits of those alluded to. It is taken from "Chambers's Journal" for April, 1841, and is as follows: "There is in the suburbs of Anderston a large house, called from its mode of construction and the vast crowd of human beings who live in it, the Barracks. It is said that nearly five hundred persons, chiefly poor Irish, live in this building, each family having one, or at most, two rooms. At one time fever was never absent from the Barracks: *five had been seen ill at once in one room, and in the last two months of* 1831 *the cases in this single house were fifty-seven.* During the five years ending with 1839 there were 55,949 cases of fever in the whole city, consequently, it will be observed this house with (say) 480 inhabitants, ought to have had, as its fair

proportion, 112 cases, the population of the city being considered, as at a medium, 240,000. But how does the case really stand? Early in 1832, at the recommendation of an ingenious surgeon of the district (Mr. Fleming), a simple tin tube, about two inches in diameter, had been let from the ceiling of each room of the Barracks into a general tube, the extremity of which was inserted into the chimney of a furnace connected with a neighbouring factory, by which means a perpetual draught was established upon the atmospheric contents of every room, and its inmates compelled, whether they would or not, to breathe pure air. The consequence—for we cannot but consider it as the consequence—was that during the ensuing eight years fever was scarcely known in that house. Laying aside one year, during which Mr. Fleming had not charge of the apparatus, there were up to last December only *four cases*."

The necessity and importance of proper ventilation being thus thoroughly established, it will be now necessary to enquire how this can be efficiently accomplished, and here a difficulty meets us at the outset, in the fact, that the quantity of air that constitutes an efficient ventilation is by no means exactly ascertained, and various authorities differ very considerably on this point. It will be sufficient for our purpose, therefore, to state generally, that as a man breathes about seventeen or eighteen times in a minute, and consumes with each breath about twenty cubic inches of air, he will require from 360 to 400 cubic inches in each minute, or, 24,000 cubic inches per hour; or, to put it more simply, 2,000 cubic feet. The cubic space allowed for each man in hospital in the English Army is 1,200 feet, but there is no doubt whatever that the cubic space allowed is not at all so important as the air supply available, or, in other words, the amount of fresh pure air that can be delivered into any given apartment. The only safe plan, then, is that which supplies a continuous flow, unlimited and unrestricted, except by the capacity of the apartment to contain it. We will, therefore, proceed to examine how this may be best attained, and to make what we have to say on this

head more thoroughly practical, we will suppose ourselves standing in a room of moderate dimensions, in an ordinary six or eight-roomed house, and we will commence by observing what may be called its natural ventilation. There are usually three principal openings by which air can enter or leave a room like this, namely, the door, the windows, and the fire-place. The door being closed, if we take a lighted candle and hold its flame at the slit at the top we will find the flame sucked outwards by the draught, while if we lower it near the floor, still keeping it opposite the slit between the door and its frame, we will find it to be blown inwards, and we can repeat the experiment with similar results at the window. If we now hold our candle at the chimney opening the flame will be drawn powerfully inwards and upwards by the draught running up the chimney. We see, therefore, that there is a current of air entering below along the floor, and a second current of air going out above, while a continuous current flows up the chimney. And here we come to one of the first difficulties of ventilation in our climate, namely, the difficulty of having a good supply of air without a draught. The air blowing in below from outside is cold and liable to chill the feet and legs, but as soon as it is warmed by the radiation of the fire, the room temperature, and the breathing surfaces, it becomes lighter than the cold air, ascends to the ceiling, and flows out above. The chimney absorbs a good deal of the fresh air when there is a fire, and we have thus a current above flowing out, a current below flowing in, and very often a body of air in the centre, which is breathed oftener than it should be, that is, in fact, comparatively stagnant and motionless, and gets very slowly renewed. It is clear, under circumstances like these, that the ventilation is deficient, and during the night time, if gas is used or powerful lamps, it will be rendered doubly so, as they absorb a great deal of oxygen and at the same time give out the unwholesome products of combustion, thus rendering the room-atmosphere still more deleterious. There have been a vast number of plans proposed to

remedy this state of affairs, and it is still, be it remembered, the prevailing state of affairs in every town and city in the kingdom, with few and comparatively insignificant exceptions. The most useful amongst those are the plans that combine warming with ventilation, or, in other words, heat the air before supplying it for breathing purposes. It may be thus described: The fireplace should be of iron with an air-chamber behind it communicating by a tube with the external atmosphere. The fresh pure air being admitted by the tube into this chamber, is heated by the radiation from the grate, and is then let into the apartment by openings near the floor on either side of the fireplace, while at convenient points near the ceiling, tubes should be provided to let the used-up air escape. The Galton stove is constructed on those principles; it acts very well and does not differ in appearance from an ordinary fire-grate.

Another method, and which only requires a very small quantity of coal, and is consequently of great value in these days of dear fuel, is thus alluded to in Eassie's work on "Healthy Houses": "Cardinal Polignac may be considered as the father of all these methods of heating and ventilation, and all stoves with caliducts may be said to have sprung from those introduced by him about the year 1713. Mr. George's calorigen is adapted for burning gas or as an open fire-place. I will first describe the gas calorigen. The body of the stove is of thin rolled iron, and is furnished with two pipes terminating in a cylinder, open only at the top, placed outside the wall. The air entering the stove to supply the flame thus comes in contact with the heated air leaving it, and some waste of warmth is avoided. The air necessary to support combustion is, therefore, slightly warmed by being diffused through the warmer air, and when used it is carried off with the other products of combustion by the upper short longitudinal pipe. There is no communication whatever between the furnace of the stove and the air of the room. The most important feature, however, is the introduction of

a coil of wrought iron tubing within the body of the stove, which communicates with the external air below the stove, and is furnished with an opening at the top of the stove. The pure fresh air is therefore warmed in its passage through this worm, but not super-heated or burnt, and flows into the room at a moderate temperature. There is, therefore, no necessity for a valve near the ceiling to regulate the exit of any hot air, as in the Laconicum of the ancient Romans."

"A coal or coke stove on the same principle, except that the air of the room supplies the air necessary for combustion, is also manufactured. Fourteen pounds of coal, which seldom costs twopence, will suffice to heat a room fifteen feet square for sixteen hours. It is therefore admirably adapted for the hall of a house, and as a means of heating and ventilating the grand staircase. I have fixed both gas and open fire calorigenes, and have never known them to fail in affording an equable warmth, joined with an efficient ventilation. Another point is that the spaces round the doors and windows, when using the gas calorigen, are converted into passages by which the air passes out of the apartment. This is thoroughly preventive of draughts, and the best cure for these disagreeables that I have ever met with." When these methods cannot be adopted, considerable improvement may be effected in the ventilation of a room by Ben Franklin's plan of having an opening made in the chimney-flue near the ceiling, and furnishing it with a movable shutter which can be opened and closed at pleasure. Perforated zinc panes at the tops of windows, air bricks near the ceiling, louvered panes, or double panes of glass, the inner having an opening at the top inside, and the outer panes an opening below, are all efficient aids to ventilation. Dr. Stallard recommends that in all workshops and schoolrooms, where a number of persons remain all day, that the ceiling should be made of perforated zinc, and should have a space above it open to the external air. By this means a constant gentle shower —if one might use the expression—of pure air is always

descending, without draught. It might, of course, be warmed by hot-water pipes, if necessary, and it does not interfere with any other ventilating process in the doors, windows, or walls below it.

In small rooms, great care should be taken that the ventilating aperture should not be too near the outlet, in which case a regular stream of air is carried through violently from one to the other, which does not mix with the room atmosphere at all, and for ventilating purposes is absolutely useless.

No matter what means of ventilation we employ, we should always have windows to open from the top, so that they can be let down an inch or two at night, and a foot or two during the day in fine weather. In the houses of the poor this is almost universally neglected. The windows either do not open at all, or open at the bottom; hence, if they are opened for a moment, the cold air comes in at such a level that it unavoidably plays directly on the persons of the inmates, very probably gives a cold, and possibly renders them averse to further attempts at ventilation. The ventilation of railway carriages, as at present constructed in this country, is very defective, and urgently calls for reform. The atmosphere in a crowded carriage is absolutely sickening, on entering it from the outer pure air at a country station, when the carriage has been some time occupied, particularly on cold or wet days. This is the less excusable, as the carriages could be readily and completely ventilated from the ceiling without draught.

The ventilation of public buildings is usually accomplished by what is called the vacuum method, the case of the Barracks at Glasgow, as already described, being a good example of that method. The *plenum* method consisted in forcing air into the place to be ventilated, and it was maintained that air so forced in, or, as it was called, compressed, contained more oxygen than ordinary atmospheric air, and was, in consequence, beneficial in some pulmonary complaints. Sun-burners in the roofs of churches and theatres which are apt to be crowded at

night are excellent means of ventilation. In over-crowded places, however, it is almost impossible to secure ventilation, particularly if the crowd is a miscellaneous one. The unwashed perspiring skin gives off in such situations a large quantity of organic matter, and the atmosphere rapidly becomes poisonous. A case in point is thus related by Coombe: "Another instance of the noxious influence of vitiated air which made a very strong impression on my mind was during a three hours' service in a crowded country church on a warm Sunday in July. The windows were all shut, and in consequence the open door was little use in purifying the atmosphere, which was unusually contaminated, not only by the respiration and animal effluvium proceeding from so many people, but by their very abundant perspiration, excited by the heat and confinement. Few of the lower classes, either in town or country, extend their cleanliness beyond the washing of their face and hands. Hence, the cutaneous exudation in such places is characterised by a strong and nauseous smell, which, when concentrated, as it was on this occasion, becomes absolutely overpowering. Accordingly, at the conclusion of the service, there was heard one general buzz of complaint of headache, sickness, and oppression, and the reality of the suffering was amply testified by the pale and wearied appearance even of the most robust." In striking contrast to this was the ventilation of the Chapel Royal, St. James's, which, though filled by over 1,500 people for five hours, on the occasion of the marriage of the Princess Royal, was felt to be perfectly comfortable, both as regards air and temperature. Mackinnell's ventilating tubes were those used on the occasion. The ventilation of the Houses of Parliament is also very perfect. In the process employed the air is first strained or filtered of all dust and minute suspended matters by screens as it enters from the outer atmosphere. It is then heated by passing over steam-pipes and chambers, and it is admitted to the House by perforations in the floor, which are covered with horse-hair cloth. In summer the air

is cooled by placing wet cloths about the iron chambers it passes through, and using spray jets liberally, which serve to cool it, while at the same time it supplies it with the necessary watery vapour. In relation to this it may be said, that in any room where a stove is the means of heating used, water should be always placed in an open vessel near or upon it, and allowed to evaporate. The stove-heated air is too dry for the air-passages, and in the cities of America sore throats, produced by the neglect of the precaution indicated, are by no means uncommon.

At the present day the general plan of house-building in cities and towns is very unfavourable to good ventilation, while in the cottages of the workman and the artisan the defects in this respect are still more numerous; and it would seem, on a consideration of all the circumstances, that obedience to the great physical law of "Breathe fresh air" is in many of them an impossibility. It is fortunately true, however, that under very adverse circumstances the physical laws can be obeyed; and, if we cannot build new work-rooms and cottages, which would be the easiest and most obvious method of doing it, still we are enabled by attention to a few simple precautions to prevent or obviate in a great degree the evils which arise from the want of them.

By a beautiful provision of Nature, the lungs, by which we breathe, are always nearly filled with air, which is stationary as to its quantity, and though we draw in our breath to the full, and expire or puff it out as much as we can, still there remains a large quantity of air in the lungs, and if this air is pure, it to a great extent enables us to resist the influence of a bad atmosphere. Now, we may renew this air very simply, by taking a short brisk walk in the open air before commencing any occupation of which confinement within doors for the day is a condition—short, because it is not well to commence a day's work tired, and brisk, because by rapid motion the breathing is accelerated, and a great deal more air enters the lungs. On return from the exercise,

if the breathing is any way hurried, it will be well to make a short delay, until the breathing becomes quiet before entering the house. It is also well to take at stated times during the day a full breath, that is, to take pressure off the lungs by raising the arms straight up over the head until the tips of the opposite fingers meet, and then bending them a little back, so that the head will be rather in front of the arms. When this position is attained a slight pause should be made, and the arms should be permitted to sink gently downwards and backwards, at the same time a deep inspiration should be taken, at the conclusion of which they should rest once more on the sides.

What an immense advantage this simple manœuvre is in enabling us to get in more air may be seen from the following: A London physician was called one evening some few years ago to see a gentleman who was supposed to be dying. He quickly arrived at the house, and found his patient, an elderly man, apparently in the last extremity, evidently from some chest disease, which interfered with his breathing. He was sitting up gasping for breath, his eyes starting from their sockets, with fear and horror of suffocation forcibly imprinted on his countenance, grasping his chair in his agony like a vice. There was no time to lose. Before internal remedies could act, even if he could swallow them, which was doubtful, the man would be dead. The physician, applying his keen common sense to the anatomical facts science had supplied him with, determined to try if he could let in more air to the struggling sufferer. He accordingly mounted on a chair behind him, and lifted his arms above his head, held them there for a second or two, and then gently pressed them to his side, in fact, carried out the manœuvre described above, as the patient was too weak to do it for himself. After a short time the breathing got quieter, and the process being continued for a few minutes, all distress ceased. The blue ghastly colour faded from his countenance, and his joy may be imagined at a rescue so sudden from such imminent peril. The

value of a good supply of air needs no stronger illustration, and we will therefore conclude with the following practical recommendations :—

1. Every morning, immediately after dressing, open the window to its full length; get close to it and take in several full inspirations in the manner above described.

2. Take a short walk at all times and in *all* weathers before passing all day at any sedentary indoor occupation.

3. Never work longer than two hours without stepping out into the air for a moment or two and renewing the air in your lungs.

LECTURE V.

THE RELATION OF POPULAR LITERATURE TO THE PUBLIC HEALTH.

"Evils of all sorts are more or less of kin, and do usually go together; it is an old truth, that where huge physical evil is, there, as the parent and origin of it has moral evil to a proportionate extent been."—*Carlyle*, "*French Revolution*."

THE subject which we now propose to consider has not as yet received from writers on State Medicine that amount of attention which its importance most undoubtedly entitles it to, and it is in some respects difficult to conceive why it should have been, up to the present, more or less lost sight of in all modern works on the subject. If it were true that sanitary science only dealt with the body or physical being of man, then indeed the effect of popular literature on the public health would be so small as to be almost inappreciable. This, however, not being the case—nay, the extreme converse being true—it may well excite surprise and regret that this all-important topic has not been dealt with by some of those distinguished writers to whose labours sanitary science owes so much, at a length and in a manner commensurate with its importance.

The influence of writings of an evil, immoral, or infidel tendency on the mental health of the population has long ago been recognised—indeed, has been made the subject of legislation, in almost every civilised state. No one now denies the pernicious influence which the writings of the impious Rousseau and—if it is justifiable in the depths to estimate a lower deep—the perhaps still more impious Vol-

taire exerted on French society, which, as they spread and gathered force, finally produced those dreadful outrages, those savage and blasphemous orgies, and those heartless and cold-blooded murders which history describes as the great Revolution. It would be difficult, indeed, to estimate the cost of those writings to the French nation, not alone at the period alluded to, but even with regard to the remote consequences they unfortunately entailed.

The almost entire dissolution of society that took place during the first French Revolution produced a race of reckless men, who, elevated by the national convulsion from obscurity into power, had their brains morbidly excited by the continual peril of their lives in which they stood. In desperation, at last they flung to the winds every philosophical and intellectual restraint that, as it was vainly imagined, was to have held them in check and prove a substitute for the faith, the religion, and the morality of which they had been deprived by their philosophers. These men, leaders of every diabolical wickedness while the Revolution was supreme, disappeared for an interval at its overthrow ; but gathering courage in time, they gradually came forth from their hiding-places, and during the rise of the Empire, began to circulate their dreadful creeds in society, under the specious name of philosophy, and even in some cases, to our shame be it spoken, under cover of medicine. Through their influence Paris, notwithstanding that it still held much that was great, noble, and true, became accounted the wickedest city in the world, the head-quarters of infidelity, where fashion and scandal became inseparable, seeming as it were to belong to each other. The effect of this state of things was such, that at the close of the First Empire, though wages were high, the general state of the country was appalling. According to Viscount Villeneuve Bargemont, the then prefect of the North, the poor of Lille was over 3,200, or more than half the population. He might well say the first knowledge of this fact on assuming office filled him with surprise and terror.

The effect on the public health was by no means trifling

or unmarked, as may be seen by comparing the death-rate of England and France for that year. In England the deaths were only one in sixty, while in France they were one in forty. Unfortunately, the remote effects upon the public health of France have been very disastrous; the lessened birth-rate, the disorganisation and demoralisation in which the second empire collapsed, may to a large extent be traced back to these evil writings as to their source. That their influence still subsisted was plain, from some of the incidents that marked the latter years of the reign of the third Napoleon, when there were not wanting in Paris active, pushing, and unscrupulous admirers of the philosopher of Ferney, who claimed for his doctrines a living, moving power in the present. They set on high amidst clamorous shouts of triumph the statue of Voltaire, with the countenance, or at least the supine acquiescence of him whose forbearance they suitably rewarded a few months later by pulling down his uncle's statue, and destroying and defacing his own effigies with every circumstance of indignity and contempt.

It may be said that though this connection between political events and remote moral and present physical causes be true, yet that it does not come properly within the domain of the physician; but to this the words of Hecker, in his preface to the treatise of "Sweating Sickness," may be well replied: "The State which founds its legislation on a knowledge of realities, which expects from the physical sciences information respecting human life collectively considered in all its relations, has a right to demand from its physicians a general insight into the nature and causes of popular diseases."

But it is not in France alone we can trace the effect of a wrongly directed literature in increasing crime. In that country its results were most remarkable, because accompanied by several phenomena at that time novel, and which arrested the attention of the world; but in England there have unfortunately been opportunities of seeing this influence exercised upon a smaller scale, in producing a

marked increase in crime. It is well worthy of note, that so lately as the year 1852 the Lord Chamberlain suppressed the performance of the play of Jack Sheppard, on the representation of the various London magistrates that the number of youthful criminals had been materially increased by its performance. This was no doubt a wise and just measure; but it must seem on reflection that if the influence for evil of a play at a single theatre was such as to call forth from all the London magistrates a demand for its suppression, what must be the evil resulting from the distribution all over the country of stories quite as pernicious in their tendency as the play of Jack Sheppard, and some of them even more so.

This evil is now assuming gigantic proportions, and, strange to say, is fed and increased by the very means taken for its suppression. Education has been always the remedy proposed by statesmen and philosophers to cure the vices and raise the social and moral standard of a people. Undoubtedly, education properly understood and carried out, will attain this end, and attain it very effectually. But powerful remedies, properly applied, will cure, and the same remedies improperly, or half applied, will aggravate the evil they are intended to relieve. The intellectual and moral natures can be no more dealt with separately without lasting injury to both, than can the physical nature be separated from either; and we have no hesitation in asserting that teaching the peasant lad, and humble factory girl, just sufficient reading to enable them to poison their minds and deprave their hearts with the wretched immoral trash which is now everywhere sold, under the pretence of harmless light reading for the people, is incalculably doing more harm than leaving them in ignorance of letters altogether.

Now this assertion may seem at first sight strange, for there are a number of people who believe, and believe, no doubt, quite sincerely, that a little reading and writing, and a little arithmetic, probably forgotten as soon as learned, is a powerful moral elevator. They are, no doubt, pleased

to dignify this smattering of knowledge with the high sounding title of education, to which it has no claim whatever. It is merely in a vast majority of cases a blind to hide the great deficiency of knowledge that exists beneath it. A labourer who can spell his newspaper, and talk dictatorially of the rights of man, may, for all that, be a very bad ploughman, and the girl who can write a wretched scrawl, or study a cheap novel, may be quite unable to make good porridge or even to boil vegetables properly. Now it would seem that the best qualification a ploughman can have is, that he should know how to plough properly, and be willing and able to do it. His capacity in this respect is certainly uninfluenced by teaching him his letters merely. The girl who is to be a future servant, or labourer's wife, has much more need of the knowledge of the needle and the kitchen, than the writing-table or the celestial globes, and hence we find that this wretched pseudo-knowledge, unregulated by common sense, and unguided by religious training, has had the effect of directly injuring instead of improving its recipients. Another remarkable effect it has produced, is that of upsetting some of the calculations of those persons who always looked at prison statistics with the comfortable certainty of seeing the illiterate in the majority. We do not mean to say that the ignorant do not hold that unenviable position still; by no means, for the stuttering reader or bungling writer is probably twice or thrice as ignorant in the true sense of the term; or to reverse the mode of expression—much worse educated than the intelligent ploughman and active dairymaid who, perfect in their own business, could not tell one letter from another.

There are two French criminal returns which are full of interest in considering this subject. The first we will allude to is the return of M. Ducpétraux "Etat Intellectual des Accusés," for the year 1828. It classifies the criminals to which it relates according to their literary acquirements. It runs thus: Not knowing how to read, 4166. Reading and writing imperfectly, 1858. Reading and writing well,

780. Superior education, 118. Now this is as our pre-conceived ideas would have it. Those who don't know how to read are in a vast majority, and there is a striking interval, a wide chasm between them and the class that is described as knowing how to read a little; while between these last and the classes that possess a really good education, the distance, in point of numbers, is immeasurable. But if we contrast with this, another French return for the year 1869, from M. Julien Hayem's work on "Sunday Rest," we will find the matter somewhat different.

CRIMINAL RETURN FROM M. JULIEN HAYEM'S WORK ON SUNDAY REST.

Different Crimes.	Not knowing how to Read.	Knowing how to Read.
Homicide	58	68
Murder	98	108
Parricide	4	5
Immoral acts	272	312
Robbery by servants ...	106	155

Here it is at once apparent, that a change has taken place, for while the class of prisoners set down as highly informed are a mere fraction of the whole amount, and the class described as able to read well, occupy a somewhat similar position of those described as able to read a little, and those described as not knowing how to read, is just the reverse of what a modern educationalist would expect, and of what appears in the former return. In fact, the class able to read a little have attained the bad pre-eminence, and are undeniably more numerous than the class altogether ignorant of letters, thus lending some support and confirmation to the much contemned adage, that, "a little learning is a dangerous thing." We have omitted from the table the other two items it contains—namely, highway

robbery and child murder, in which those not knowing how to read were in the majority; for in these crimes there is a very obvious explanation in the circumstances of the one, and the accident of strength and stature required as a rule for the other, which puts them in the class of complicated causes, and fairly excludes them from the argument. Without at all attaching too much importance to these returns, they furnish still further evidence, if evidence be wanted, that education, or, more properly speaking, half education, or mere superficial book learning, without religious training, is in a vast number of cases a dreadful evil. It simply confers new powers for mischief on its possessor, and often renders him, who, without that knowledge, might be a useful and industrious member of society, a disgrace and a danger to the community.

In seeking for the channels through which poisonous literature, in these countries, reaches the masses of the people, the penny weekly pictorial journals at once come into view as the principal or main factors in its dissemination; and though, perhaps, it would be difficult to prove their actual responsibility for legal crime, or direct law-breaking, that they indirectly increase it, admits of no reasonable doubt. The effect that they have on the increase of crime is, however, as nothing as compared with the ravages they commit on the health of the community. It may, at first sight, seem an exaggeration to say that the circulation of a penny weekly journal, in any town or crowded neighbourhood, containing the usual supply of stories of a doubtful or immoral tendency, with the farrago of nonsense, or worse, yclept answers to correspondents for one year, will increase the death-rate in an appreciable degree, and very greatly increase the sick-rate amongst the growing adult population; but nevertheless, we believe it to be perfectly true, and we will now proceed to indicate shortly the grounds on which it rests.

No one we apprehend will deny that of late years there has been an immense increase in the number of what are called nervous diseases. In point of fact they have latterly

become so numerous, that they partly form, or complicate, a majority of all diseases now met with, in both public and private practice. If this proceeds from some mere physical cause, the nervous diseases of childhood and old age, which are both subject to the same conditions of life as the class hereinafter mentioned, should increase in equal ratio, when in point of fact, they have not done so. The increase is observed to occur in persons from the age of fifteen to thirty, or thirty-five. Now it is precisely within these limits of age that the emotional or imaginative faculties are at their greatest development, it is at this age they are most liable to be injured by over excitement or depression; it is then that they exercise their most powerful influence on the health and life of the individual. Now there is no doubt that these are the very persons who read the publications to which we have alluded, and who are thereby affected so seriously, that in many cases the whole physical, as well as the moral nature, becomes a complete wreck; and the life that was so full of hope and promise, dies out miserably on the very threshold.

Even in cases when the evil does not proceed to those extreme lengths, its power for mischief is shown in perhaps a less striking, but hardly a less formidable degree. The young girl whose imagination has been brought under the influence of those sensational trashy stories, where the lady's maid's beauty causes the nobleman to marry her, instead of her mistress, lady Fanny or lady Gertrude, to whom he is engaged (for there is seldom any lady without a title in the story except the fortunate maid), is apt to be very discontented with her real position, as the wife of a struggling artisan or small tradesman, and is very likely to make a careless slatternly wife, and possibly a worse mother.

The excitement begot by such reading is also like every other excitement, followed by depression, and when long continued, or frequently repeated, has a serious and often permanent effect on the constitution. The vitality of such persons is at a low ebb, and they frequently fall easy victims to the first catching disease; for in the matter of

infection or contagion, there is nothing truer than that the weakest goes to the wall.

In considering this subject, it is impossible to avoid noticing the very large increase in deaths from nervous diseases which have been registered of late years, Taking for example the year 1857, we find that in that year there were 775 deaths from softening of the brain; while in 1866, the number of such deaths registered was 1664. This fact possesses a grave significance, when we consider that softening of the brain is a disease that attacks frequently in the middle period of life. It is, therefore, more likely to carry off the bread winners, the fathers of families, and, and, therefore, belongs to a class of diseases that thus considerably increases pauperism. Again, we find the number of deaths from inflammation of the brain steadily increasing, We will take a large number of the population, as it is not a very common disease, and its increase is thus more readily appreciated; thus, out of a million of persons, 178 deaths from this disease occurred in 1857, and in 1866, in the same number of persons, the deaths had risen to 197. The sum total of deaths from all brain diseases registered in England and Wales in 1866, amounts to the enormous figure of 61·164. Now this is worthy of the most serious consideration, for there is no doubt that many forms of brain disease are largely influenced by moral causes, and several of them are referable to those causes for their origin in the first instance. It will be remarked, that the spread and development of the penny weekly journals is also decidedly contemporaneous with the increase that has taken place in those diseases. This literature, in fact, attacks public morality in a new and most insidious form, and it is on that account it has hitherto, to a great extent, escaped the notice it deserved.

A corresponding class of literature has worked, and is working, dreadful mischief in other countries beside this, but it is in this country that up to the present, at any rate, it has received the greatest favour and encouragement. But besides the illness and death—to say nothing of the

dreadful scandals and the miserable outcasts this reading produces and is directly responsible for—it also indirectly leads to an increase of the drinking evil. Depression is relieved by artificial stimulus, and thus the evil, as evil has always a tendency to do, advances in geometrical proportion, ever doubling and swelling the always increasing flood of vice and consequent pauperism.

Another proposition might consequently be laid down with a very considerable degree of reason, viz., that for every penny weekly journal, containing stories of doubtful or immoral tendency, that circulates in any centre of population, the poor-rates of that place will be materially increased. If there be any truth in what has been already advanced, this proposition need not meet much opposition. If such reading tends to produce a condition of the nervous system which leads to disease, if disease produces incapacity to work, most undoubtedly the rates must pay for all, and do pay for all, and poor-law guardians go on grumbling and protesting, trying to check the constantly rising tide by cutting off a little stream of imposition here, or of people belonging to another parish there, but never seeing what is at least one of the great sources of the evil, which they consequently never dream of touching. Nay, it is encouraged to flow by the praises which are constantly lavished on the practice of reading amongst young people, while what it is they read is rarely inquired into.

Having indicated, feebly enough, the evil and its consequences, it now becomes of importance to discover a remedy. This is theoretically a very simple matter, but in practice it is one of enormous difficulty. It may be hoped, however, that when the evil becomes better understood, the difficulties in the way of lessening or removing it will gradually become less formidable. It would seem that the only effective measure that can check it to any perceptible degree is the suppression or suspension of any objectionable paper, or at least the prohibition of its objectionable stories from proceeding. This will doubtless be at once met by an exclamation against the impolicy of attack-

ing the liberty of the press. Now it does undoubtedly happen that in this country, and under the present conditions of society, the liberty of the press is a most important safeguard against many evils. Publicity, if it has its dangers, has also incalculable advantages, that far outweigh them in the majority of cases; but this mostly applies to the daily press, and only in rare and exceptional instances to the class of papers that do the mischief here complained of. Not, indeed, that the daily press can be held altogether blameless for many of its reports, but it is to be hoped that a public opinion, properly educated, will see the immense sanitary advantages to be gained by the suppression of such hurtful and dangerous matters, as the proceedings of the Divorce Court, and occasionally other infamous trials. The evil influence exercised by those and kindred reports is not noticed because not seen, but if we consider for a moment one or two analogous cases we will be sufficiently impressed with its power for mischief. If a suicide, for example, is reported in the daily papers, particularly if there is anything peculiar about the manner of its committal, it often happens that several similar cases occur in quick succession. This can only be explained by the evil influence of bad example brought under the notice of minds depraved enough to follow it. Again, the report of a robbery, or outrage, or even a murder, sometimes seems to give rise to several others, and it is not unreasonable to suppose that like effects follow from like causes in other classes of cases that do not come directly under the public notice. Further, it may be remarked that there is no possible advantage to be gained by the publication of such matter, and neither harm nor injury to any one is possible by its discontinuance. However, this mischief is as nothing compared to that done by the non-political, non-newspaper penny weekly publications, and it would seem possible to devise some plan by which the worst of them, at any rate, could be either stopped or regulated.

The question resolves itself practically into this — What authority is to decide that such and such a pub-

lication is injurious to the public health? The answer is obvious—the principal health officer in the kingdom. He might issue his certificate, and the Board might then direct their officers to obtain an injunction against the proprietor, calling on him to show cause why his paper should not be suspended. It might be left to the discretion of the judge whether for a second offence a fine could not be inflicted. By this or by some similar mode the flood of dangerous literature would be diminished or very sensibly purified; and in the end it must come to this; for if publications like those spoken of be allowed to continue their destructive career unchecked, evils of, if not greater, at least more pressing magnitude will arise. The modern race of Englishmen, it is said, are gradually becoming stunted and unhealthy. The modern race of labourers and operatives are decidedly becoming, day by day, more insubordinate and difficult to manage. Strikes are frequent, and discontent amongst them almost universal. They have reason too for their discontent, for they are suffering many severe physical evils. But it may be asked—Why should they suffer? their wages are higher, their hours of work shorter, their food and clothing better than at any other time. The answer is plain—They have no moral restraint; they have knowledge without education. The literature they read has distorted their views of life, made them discontented with their lot (however fortunate), while it has rendered them irritable and unhappy by the unsound and pernicious view of life it has taught them to entertain. It is much to be feared that if a remedy be not soon applied, and applied most thoroughly, society will with difficulty escape the serious dangers from this source, with which it is at present threatened. It is one of the great missions of sanitary science to show the connection that exists between physical and moral good, between public virtue and public health; to teach that one is impossible without the other. When the public come at last to recognise the truth, that as surely as heat proceeds from fire, or cold from snow, so surely do disease and pauperism proceed from

immorality and vice, no matter what shape or form that vice or immorality may take on—either a newspaper report or a penny weekly story—then indeed we may hope for a much-needed, long looked-for improvement.

Though the penny weekly journals do the largest part of the harm complained of, they are by no means the only offenders, and heavy indeed is the responsibility of those writers and pseudo-philosphers of a higher class who have set the example of this evil to their lesser brethren, and have in too many cases unsettled the belief, and thus relaxed the moral restraints of those whose position and influence made their example important. In the present temper of the public mind it is difficult to see a favourable issue possible out of the present state of affairs, but most assuredly the best and brightest hope of such an issue lies in the better understanding, by the public, of the close relation that the popular literature bears to the public health.

LECTURE VI.

FOOD.

"Since an account of the properties of food is a part of the doctrine of hygiene, we shall add that to the preceding, having premised only a few remarks before delivering the particular rules on this head, for nothing is more indispensably necessary than to be well acquainted with the properties of food." —*Paulus Ægineta*, Lib. i.

THE magnitude of the subject of food, which we propose to consider in this lecture, compels us to exclude many of its interesting and instructive divisions from our consideration, as certain sorts of adulteration, manufacture, price, &c. Even as to the description of food that ought to be used, we will say but little, as it is probable that it will always remain the fact, that the general mass of the people will eat that food which they find to be at once the cheapest and most palatable. That the popular voice in this matter is not far wrong may be learned from the fact, that the extreme fondness for fat the inhabitants of cold countries display, is quite in accordance with the results obtained by modern science. Chemistry tells us that fat keeps up the animal heat in the system, and consequently enables it to resist cold better. This explains the partiality that the Russian and Laplander have for oil or fat. They will drink even lamp oil freely, and have been known to eat tallow candles. We will therefore consider food principally with reference to its sanitary bearing on individuals, and in doing this, the first question that presents itself for solution

is that which relates to the most suitable description of food for human consumption. As to this there has been considerable controversy, and a modern sect of well-meaning philanthropists maintain that the food of man should be exclusively vegetable. Nature, however, is a safer guide than any such theoretical doctrinaires, no matter how well meaning. For instance, if a naturalist wishes to find out what food an animal is fitted to consume, he first examines its teeth, and they yield the required information with very sufficient accuracy. The tiger has canine teeth to tear his food, which point him out a flesh-feeder; the sheep has incisors, or cropping teeth, which point him out a grass-feeder; and the elephant has molar teeth, broad and rough for grinding grain. Now if we examine the teeth of man, we find he possesses some of each class—canine, incisor, and molar, and we at once justly conclude that he is intended to eat every variety of food, which his skill can procure, or his circumstances require.

Various speculations have been entertained from time to time as to the influence which different foods have exercised on the physical and mental qualities of the various races of mankind, and the rice-fed native of India has been contrasted with the Englishman fed on good beef, and deductions favourable to the latter food have been drawn from this consideration. The thousand sources of fallacy in this mode of reasoning are, however, too apparent to lend it any weight in deciding the question. That food has some influence is highly probable, but its nature and amount are still doubtful in the extreme. Playfair has remarked that the bears of India and America which feed on acorns are mild and tractable, while the polar bears that live on flesh are very savage and untameable. It would appear reasonable to suppose, however, that animals would be much more influenced by the nature of their food, as their physical organisation is so predominant, than man, in whom the mental powers are so decidedly superior and more influential.

All foods of whatever kind are primarily derived from

the vegetable kingdom, for the flesh of animals must be regarded as vegetable in a higher state of organisation and progression. Strictly speaking, neither man nor animals derive any sustenance whatever from the mineral kingdom. What portions of minerals they require,—and there are various salts absolutely necessary to build up and preserve the body—are absorbed from the earth by vegetables, and in this way presented to them in a convenient form for assimilation. It has been anticipated that the progress of chemistry would yet enable us to construct a nutritient food from minerals, but all efforts in this direction have up to the present proved futile; for though the nutrient salts, or salts absolutely found in the tissue, can be produced, still they do not act in a similar manner to those produced by the natural processes. Indeed, in much simpler matters the act of nutrition is by no means as yet perfectly understood, as may be gathered from the fact, that many constituents of meat chemically separated and then recombined, will not support life, though in no way *chemically* distinguishable from meat itself.

One of the first questions demanding our attention in dealing with food is the quantity necessary to support life, and in this respect there is a wide difference seen in different climates and races. The inhabitants of hot countries live on very small quantities of food, as, for instance, the native of India, on his meagre allowance of rice and butter; while the inhabitants of northern climates seem able to dispose of a much larger quantity, which is also more highly nutritive in character. As an extreme instance of this capacity for absorbing food, we may mention the Esquimaux lad, of whom Captain Parry relates that he eat within twenty-four hours 4 lbs. 4 oz. of the raw frozen flesh of a sea horse; the same quantity boiled; 1 lb. 12 oz. of bread and bread dust; in addition to which he swallowed a pint and a quarter of rich gravy soup, a tumblerful of strong grog, three wineglassfuls of raw spirit and nine pints of water. This would seem at first sight impossible, but there are many other well-authenticated instances of the

enormous quantity of food these people are capable of consuming. The explanation has been advanced that the extreme cold of the climate permits, or enforces so much exercise, that absorption takes place with great rapidity; and fat being, as before remarked, a heat-producing food, there may be a natural facility in the race to absorb it, as in all those recorded instances the largest part of the meal was fat or fleshy. In the matter of bulk the Irish peasant will eat three quarters of a stone of potatoes daily without inconvenience. It is hard to estimate the average amount of the diet in general use amongst mankind, but an approximation may be attained by considering the diets known to be used in several countries. Liebig gives the diet of the Bavarian wood-cutter for five days thus:—On going into the forest to work on Monday morning after breakfast, his master gives him 3 lbs. 4 oz. of dripping, 7 lbs. 8 oz. of meal, and 4 lbs. 5 oz. of bread. He remains out until Saturday evening, when he returns for supper. This, then, is his food for five days, though he may perhaps supplement it somewhat from wild fruit, herbs, or berries growing near his working place. The official return of the yearly government allowance to a Russian peasant is also worth recording, and it will be remarked that the allowance of fats *per se*, as butter and meat, is by no means large for his cold climate. The yearly allowance is 451 lbs. of rye flour, 421 lbs. of wheat flour, $5\frac{3}{4}$ bushels of buck wheat, and $30\frac{3}{4}$ lbs. of peas; $17\frac{1}{2}$ lbs. of oil and butter, $32\frac{1}{2}$ lbs. of salt, 117 lbs. of meat, and a little fruit and cabbage; or if we reduce it in an approximate manner to a daily allowance, we will find he consumes 1 lb. $4\frac{1}{2}$ oz. of rye flour, 1 lb. 2 oz. 7 drs. of wheat flour, about 1 pint of buck wheat, 1 oz. 5 drs. of peas, 12 drs. of oil and butter, 1 oz. 6 drs. of salt, and 5 oz. 2 drs. of meat, which give him 3 lbs. $15\frac{1}{2}$ oz. weight in each day's food; water, of course, is not reckoned; while the Bavarian gets nearly 15 oz. less of solid food, his allowance per day weighing as nearly as possible 3 lbs.

The weight of food is, however, by no means a decisive test of its nutritive value, though, as a rule, any material

reduction in bulk without injuring its nutritive properties is very difficult. This difficulty was very effectually overcome in the last Franco-Prussian war, and a sausage of small bulk was manufactured on a large scale in Berlin, for the army. The preserved peas of which it was in great part composed were kept from souring by the addition of some peculiar secret preparation which the Prussian Government purchased from the inventor for a large sum. One of these sausages was sufficient for the daily food of a German soldier, and was easily cooked by boiling in water for a short time. The scientific estimate of the daily average quantity of food necessary for a man being 110 ozs., of which 70 ozs. should be water, we have 2½ lbs. to 3 lbs. in these diets, which closely approximate to the scientific view. The German army war ration daily per man is thus given in the appendix to the report of the Army Medical Department for 1870. Bread, 26½ ozs., or biscuit, 17 oz.; then one or other of the following three meat stuffs, the quantity allowed, it will be remarked, being different according to the nature of the meat;—thus, of fresh or salt meat, they got 13 ozs., of salted beef or mutton 9 ozs., of bacon 5¾ ozs.; they received 4¼ ozs. of rice, and 4¼ ozs. of barley or groats, or there was substituted for the latter either 8⅛ ozs. of peas and beans, or a similar quantity of flour. Finally, they received 3⅓ lbs of potatoes, the seventh of an ounce of salt, and the same quantity of coffee if unroasted, or one ounce of roasted coffee. Thus they had over 3 lbs. of solids in their food per man, besides over 3 lbs. of potatoes.

This diet was constructed on sound scientific principles, and is an excellent example of a good working diet for men engaged in hard labour. The excellent health enjoyed by the German army during the war was no doubt in a great degree attributable to it. If we now glance for a moment at the diet scale of the British army, we find that the English soldier in India receives a daily ration of meat 1 lb., bread 1 lb., vegetables 1 lb., rice 4 oz., sugar 2½ oz., tea or coffee 1¾ oz., and salt 1 oz. This diet again approaches closely the three pounds of solids necessary in the daily

food of man, and if we examine the statement often advanced, that our forefathers were men of greater development and physique than their present descendants, by the food test it is interesting to remark, that as far as the bulk of the solids goes, it very closely approximated to that considered necessary at the present day; for, according to Froude, in the reign of Edward the Sixth, the daily allowance of the English soldier was 2 lbs. of meat, 1 lb. of bread, and a pint of light wine. It will be apparent that the meat is greatly in excess of that allowed in our modern diets. But it is not by any means necessary that the diets here indicated should be used in all cases. They are all hard labour diets, and would require a high state of health and constant bodily exertion to ensure their proper digestion.

The ordinary prison diets are much less nutritious, and there is naturally an immense variety in the dietary of the labouring artisan and operative classes throughout the kingdom. If we take from the excellent diet tables of Dr. Smith, the diet of the London needlewomen, and the Scotch farm labourer, and compare them, we will find that the former contrive to live on about a pound of bread, five or six ounces of potatoes, one ounce of sugar, three ounces of meat or fat, usually dripping, one ounce of milk, and a teaspoonful of tea, while the latter consume very nearly two pounds of bread, nearly two pounds of potatoes, a little less sugar and meat, a pint, or nearly sixteen or twenty times as much milk, nearly half an ounce of cheese, and a little less tea. But then it must be remembered that the poor needlewomen barely manage to exist, and fall frequent and easy victims to disease. Indeed when the natural quantity of food is permanently lessened amongst a people, disease very shortly makes its appearance. The Irish famine fever is an unfortunately familiar instance of this fact.

The dreadful mortality, too, of the British army during the earlier part of the Crimean war was a very striking example of the direful effects of insufficient food. The men

were dieted as if in barracks, a diet which was utterly insufficient to enable them to resist the cold, watchings, and immense exertion in the way of trench duty they were subjected to. As soon as this was remedied, the unprecedented mortality which it is stated was at one time as high as seventy-three per cent. of the whole army, rapidly declined, and the army concluded the campaign in fair health. The same results followed on a smaller scale in the prison of Millbank in 1832, as related by Carpenter. The prisoners confined there had usually a daily ration containing two pounds of boiled or dry food, and it was generally considered that they enjoyed fair health. In that year, however, the diet was reduced to twenty-one ounces, or little more than a pound and a quarter of solid food, and animal flesh formed no part, or a very trifling one, of the new diet. The health of the prisoners almost immediately began to give way, they lost colour, flesh, and laboured under general debility; and in a short time, numbers of them were attacked with various lowering diseases, and cases of scurvy, maniacal delirium, convulsions, and apoplexy were frequently met with. About half of the prisoners were affected by illness in this way, and that the cause of the illness was the diet, is apparent from the fact that the prisoners who were employed in the kitchen, and who in consequence received an additional eight ounces of bread per diem, continued in the possession of their usual health and strength. The diet being raised again to its former quantity, the sickness gradually disappeared.

The delirium that the starving survivors of shipwreck drifting about the ocean, with little or no food, and which is attributed by the sailors to drinking salt water, is probably caused by starvation alone. In times of scarcity, it is very necessary to know what is the most nutritious food which can be procured for the smallest money expenditure, and one of Dr. Smith's handbills of such information may be here quoted:—

"Bread and flour.—Select households or seconds bread or flour. Do not eat bread when it is new, but keep baker's

bread one day and home-made bread three days before it is eaten. Do not keep it too dry, but cover it up in an earthenware jar. When it has become dry make it into puddings, or add it to broth. Bake at home if you have an oven or firing. A labourer should eat daily nearly two pounds, the wife and growing boys above ten years of age from one pound and a quarter to one pound and a half, and every child as much as it desires. Eat it slowly. If you are very poor, spend nearly all your money on bread."

In these countries, however, and principally amongst the better classes, a meat diet is considered absolutely necessary to health and comfort, and in view of the present high and increasing price of meat, it may be well for a moment to draw attention to the fact that it is by no means an indispensable article of diet. Indeed the following instance related by Mr. Chadwick would to some extent go to prove its inferiority to diets from which it is excluded. The diet of soldiers in barracks consists of three quarters of a pound of beef or mutton, one pound each of bread and potatoes, with tea and coffee for breakfast and supper. They also usually drink a certain amount of beer, whiskey, and other stimulants. The death-rate amongst these soldiers is 17 per 1,000. Some of them were put into military prisons in Ireland, where they were fed on half a pound of oatmeal, half a pound of Indian meal, and the same quantity of wheaten bread each day, and a pint of milk. They had neither meat, tea, beer, or tobacco, and yet their general health and strength greatly improved, and the death-rate declined to two-and-a-half. The fact, of course, must be remembered, that they were badly-conducted men previous to their confinement, and that their health would naturally improve on being prevented from getting drunk and otherwise misconducting themselves. It is certain, however, that men may enjoy full health and strength on any nourishing diet, even one from which meat as such is excluded, though it is still the fact that the elements of meat are to be found in every nourishing diet, and that a diet deprived of them totally would not support life.

Bread, called aptly the staff of life, need not detain us long. It is, as previously stated, better eaten the day after baking than when it is in a fresh or warm state, for though it is then undoubtedly more palatable, its glutinous nature, before it loses some of its moisture, makes it difficult of perfect mastication, and therefore of digestion. The most frequent and harmless adulteration to which it is subject is the addition of rice flour to whiten it, which is extensively practised in Paris. Alum is used for the same purpose, but when present in bread in any quantity, its effect on the health is serious. A good test of its purity is the length of time it keeps; bad bread soon gets sour and then mouldy. Letheby tells us that "in olden time the remedies for such misdemeanours were quick and effectual." In the Assisa, panis, for example, as set forth in Liber Albus, there are not only the strictest regulations concerning the manner in which the business of the baker is to be conducted, but there are also the penalties for failing in the same. "If any default" it says: "shall be found in the bread of a baker in the city, the first time, let him be drawn upon a hurdle from the Guildhall to his own house through the great streets, where there be most people assembled, and through the great streets which are most dirty, with the faulty loaf hanging from his neck; if a second time he shall be found committing the same offence, let him be drawn from the Guildhall through the great street of Chepe in manner aforesaid, to the pillory, and let him be put upon the pillory and remain there at least one hour in the day; and the third time that such default shall be found, he shall be drawn, and the oven shall be pulled down, and the baker made to forswear the trade within the city for ever."

Meals of various kinds, oat, barley and Indian, have excellent nutritive qualities, and are, amongst the poorer classes, in many countries, the staple article of diet. Their effective nutrition is greatly heightened by proper cooking, and it is in this respect that an enormous waste is constantly going on amongst the poor. Peas are also highly

nutritious, but they require prolonged boiling or stewing to make all their nutritive qualities available. Rice is perhaps the most universal food, but it is always supplemented by some other food. Of all the poorer sorts of food the preference must be given to Indian meal, when properly cooked; but it requires steeping for some hours in cold water before boiling. Dr. Letheby thus alludes to it: "The nutritive power of Indian meal is very high, and considering its price, it is almost, if not altogether the cheapest food for the poor. Calculated according to the physiological wants of the system, a week's diet for an adult will only cost about elevenpence, and excepting split peas, which are difficult of digestibility, there is nothing approaching it for economy."

Amongst the better classes and for children, arrow roots are now largely used. They are manufactured from tubers of various kinds. English arrow-root is manufactured from the potatoe. Their nutritive power is low. It may be also mentioned in this place, that though ripe fruits, chemically considered, are of low nutritive value, they nevertheless fulfil important functions in the economy, and their use in moderation is decidedly beneficial.

It will be convenient here to devote a few words to an article that forms a large and important part of our daily food—namely, water. Potatoes, for instance, contain 74 parts of water to 26 parts of solid or nutritious matter, while so apparently dry a substance as wheat flour has 15 parts of water in every 100. To support life, we must take in about four pints daily, either in our food or by drinking, and when water is taken fasting, it is readily absorbed by the digestive organs. In this way it becomes a most valuable medicine, which passing all through the system—a pound of water is exhaled daily by the breath, and a pound and three-quarters by the skin—washes away many impurities which might be dangerous, or even fatal to health and life if retained in the body. Its value to a community, therefore, is simply incalculable, when supplied in sufficient quantity from a pure source, but it is

to be feared that in many places when the water is supplied from wells, it is next to impossible to procure it in a pure state. In loose soils, no matter how deep the wells are, impurities draining through readily find their way into water, and produce disease in those who drink it. Any one obliged to drink water from such a source should first boil it. This gives it a flat taste, which can however be removed by the well-known process of dashing the water quickly for a few minutes from one vessel to another.

Of animal foods milk may be said to stand first. It has been called a typical food, for it is capable of supporting life alone; indeed, all children derive their sole nutriment from this article of food during the earlier months of their existence. Seen under the microscope it appears a clear fluid with innumerable little oil globules floating in it. This is the butter which floats to the top and forms the cream, when the fluid is allowed to stand. It is somewhat heavier or denser than water, thus, if we call water 1,000, milk will be 1,032; by this means its principal adulteration, which consists in its dilution with water, is readily detected, as the milk tampered with, loses its specific gravity and approaches to that of water. It might seem at first sight a harmless adulteration, but in reality it is not so, for there are probably more deaths caused by watered milk than by all the bad meat that finds its way into the market. If we reflect that it forms the principal food of the children of the poor, that because of their limited means, if the child grows thin and puny on the watered milk, they cannot afford a larger supply, we will easily recognise the necessity of putting down this form of adulteration with a strong hand. The danger of this practice does not even stop here, for if the water used in the adulteration be impure, it may be the means of causing and spreading the most dangerous diseases. The late outbreak of typhoid fever in London, alluded to in a subsequent lecture, is a good example of this.

It should be noted that the milk drawn from the cow in

the morning is poorer than that drawn after the day's feeding, and that the milk also at the commencement of the milking is poorer than that drawn last.

It will not be necessary for us to consider meat at any length, for it may be truly said that the lean of all meat is the same as to its nutritive power. The different value that different meats possess in sustaining the body, arises mainly from the different degree of digestibility belonging to each, and the method adopted in cooking them has a great influence on this. Lean meat requires to be supplemented by bread or potatoes, but very fat meat as fat pork will require lean meat, as rabbit or chicken along with it. Venison is lean, and dark, and contains more blood than beef or mutton. It is indirectly more nutritious, because it is more digestible. Englishmen are said to eat more meat than any other people; but there is no doubt that the value of good soup is not at all sufficiently appreciated in these countries, nor is the meat in consequence utilised to the extent it should be, in either affording or supplementing food. The French are in this matter far in advance of us. They have recognised the fact that good and nutritious soups can be made of many parts of the cow, now never thought of as a purchasable commodity, in the generality of middle-class houses in this country. Ox head and broken meat bones make a fairly good soup, and are of immense value in flavouring the pea and other nutritive vegetables. The extract of beef now so generally used is an excellent flavouring substance, but it cannot be properly looked upon as nutritive. It is stimulating and restorative, but would not support life alone. Conjoined with vegetables, flour, or peas, which contain the nutritive elements it wants, it suits very well. Bacon is a good food, it differs from fresh meat, in that it contains more fat and less water. It should be eaten with eggs, peas, beans and poultry, as it supplies the nutritive heat-giving constituents that they want. Poultry by itself is not very nourishing. Fish is an excellent article of diet when a fair amount of

other foods can be combined with it. Salmon has probably the highest nutritive value and oysters the greatest digestibility.

With all foods common salt is indispensable, and must be used in greater or lesser quantity, if health or even life is to be preserved. This fact has been recognised from the earliest ages, and many curious incidents have been recorded of its value in uncivilised countries, as in Africa where in parts of the country it is worth half its weight in gold, and a man can be purchased for a handful. Chemistry tells us a strange and deeply interesting fact concerning it —namely, that it is invariably a constituent of the blood, always constant in quantity, being neither increased or diminished, no matter what amount of it may be consumed. Its special use in the economy is unknown, but it has undoubtedly the property of forming crystalisable compounds with many of the effete or worn out constituents of the body. We perceive it to be a necessary part of our food by the craving for it we experience, when it is not present in sufficient quantity; but its necessity has been demonstrated also by direct experiment, for the French Academy had animals fed on food absolutely deprived of salt, and though they were plentifully supplied they died of starvation.

The various efforts which have been made with more or less success, to provide cheap dinners for the poor, should meet with encouragement and support from every one interested in preserving the public health; for it is the poor who are the great victims of the dishonest trader. Most of the bad meat is sold to them after dusk on Saturday nights, and, it may be remarked in reference to this subject, that it would be well if instead of the present arbitrary division of meat into good and bad, laid down in sanitary codes, there could be substituted two classes of meat, No. 1, and No. 2. There is no doubt whatever, that a considerable proportion of the meat at present sold to the poor, is cut up for sale, after the death of the animal from disease, or when it has been killed in the last stage of disease,

and medical officers of health called upon to pronounce whether a certain carcase is good for food or not, are sometimes placed in a difficult position. It is a notorious fact that braxy mutton is constantly eaten by highland shepherds, and there seems little doubt that many cattle killed by the lung disease, have also been eaten. That occasional bad results follow such practices may be admitted, and it is stated that there has been an increase in the deaths registered in this country from carbuncle, since the lung distemper attacked our flocks; but it is also true, that a great deal of this meat is undoubtedly nutritious, and when eaten, produces no perceptible evil results. Whether this is due to the remarkable protection afforded by the antiseptic action of the digestive juices, or whether the protective power of cooking prevents the mischief is at present undecided. It is probably due to a combination of both. It would seem, considering all the circumstances of the case, that it might be advisable to authorise the sale of second-class meat at a reduced price, compelling the vendor to label it as such, and as the antiseptic power of thorough cooking is great, it might be provided that he should hand a printed slip containing proper printed directions for the cooking of such meat to every customer who dealt with him for the article. By this means a considerable addition to our available supply of food would be made, and as there would then be much less temptation to secret traffic in dead meat, it is probable that it would in point of fact produce a considerable improvement in the diet, and sensibly lessen the danger that the poor are now exposed to from this source. As an example of a cheap dinner for the people, it may be mentioned, that up to a recent period, at any rate, in the working dining-rooms in Glasgow, a good dinner might be obtained for fivepence, consisting of good pea soup, boiled beef, ten ounces of potatoes, and pudding, all of the best quality. Some years ago, Mr. Riddle proposed a scheme by which dinners could be sent out ready cooked to the homes of the poor at a very moderate cost, in tin canisters, varying in size, according to the number of

the family, each containing baked or boiled meat and vegetables, and served at the doors hot; being kept so by an arrangement by which each fitted into a compartment in a cart constructed for the purpose. Dr. Letheby remarks, that none but those who are acquainted with the utter helplessness of the poor in the matter of cooking food, or who know the difficulties of even better classes of persons in this matter, can form any notion of the value of such a proposition, which he thinks perfectly practicable. At the same time, it must be borne in mind, that the best food, if it is always the same, will not only soon cease to be attractive, but seems absolutely to lose a good deal of its nutritive power. The system requires change to preserve health, and the natural tastes may be trusted to point out the proper variety. In the words of Liebig, "There is a law of Nature which regulates these things, and it is the elevated mission of science to bring this home to our minds; it is her duty to show why man and animals require such admixture in the constituents of their food for the support of the vital functions, and what the influences are which determine in accordance with the natural law changes in the admixture." The knowledge of the law elevates man in regard to an important function he possesses in common with the lower animals, above the level of those beings which are destitute of reason, and supplies him in the regulation of those bodily wants which are essential to his existence and prosperity, with the protection which the lower animals do not require, because in them the commands of the instinctive law are not opposed or overpowered by the allurements of sense or by a perverted and resisting will.

The kind of diet we use, always supposing it is fairly nutritious, is not of so much importance to our health as the way we use it. Indeed, amongst the upper and well-to-do middle classes in most countries the principal error in diet is over-feeding, and the Lenten fast in Catholic countries, is certainly useful, and well calculated to im-

prove the health and prevent sickness in strong, vigorous people. There are three important points to be attended to in the use of food, if we want to get the full value in health and strength out of it which it is capable of giving. The first is as to the time of meals. This should be always regular, as far as possible. Breakfast, dinner, and supper should occur about the same hour every day. The second is that at least five hours should elapse between one meal and another, and there should not, as a general rule, be a longer fast than six hours, except, of course, during sleep. The third point is the cooking. This is a most important point, because good food may be rendered unfit for use by bad cooking. It would be obviously impossible to enter into the subject of cooking at any length in the present lecture, but we may mention one cooking appliance which would seem to be a decided improvement on the old methods of cooking. This is Warren's cooking pot, which is simply a double saucepan, made by having a smaller covered saucepan fitted into a larger one. The inner vessel receives the meat, and the outer vessel having a little water in it, the resulting steam cooks at the temperature of boiling water, and as it cannot exceed that temperature the joint retains many of its juices and flavours, which it loses at the higher temperatures it is usually subjected to. It may be browned in a few minutes before the fire afterwards, if desired.

The ancients, it is said, were unacquainted with the method of boiling meat. Homer makes no mention of boiled meat dishes, and in the dinner given by Achilles, in the ninth book of the Iliad, the meat is broiled. It has been put forward, and supported by plausible arguments, that as a people become refined cooking improves, and the undoubted chain of connection that exists between the brain and the stomach is here sought to be strengthened by another subtle link. The French are at present undoubtedly the first in the art of cooking, and a very curious historical reason has been advanced to account

for their supremacy. It is said that after the death of Louis XVI., all the skilled cooks to the king and the nobility being suddenly thrown out of employment, dispersed themselves all over the country, and became in each district a centre of knowledge in the culinary art, and thus diffused amongst their countrymen the skill for which they are so famous.

The knowledge of cookery possessed in these countries generally is most deficient, particularly amongst the poorer classes, nor is it very clear how it is to be remedied except by the introduction of a small catechism of plain cookery into all primary schools—and, indeed, female schools generally. It may be remarked that meal is almost always badly cooked by the peasantry. Oatmeal takes at least one hour and a half of slow boiling to cook it well, and Indian meal at least half an hour longer. This makes a wonderful difference in the taste of the stirabout or porridge prepared from either of these meals. When properly cooked, besides yielding more nourishment and consequently more strength to the labourer, it is at least twice as palatable. Amongst the better classes, the present custom of hashing cold meat is very much to be deprecated. Cold meat, though less digestible than when freshly cooked, is still a good diet enough, but second-cooked meat is an unwholesome and indigestible food. It would be far better to cut the joint in two or three parts and cook each part separately for the day's dinner on which it is required. This is a matter that deserves consideration, for indigestion—or difficult digestion—is easily induced by unsuitable food, and a long train of domestic miseries is the consequence, even when positive ill-health does not follow. There is a close nervous connection and wonderful sympathy between the brain and the stomach, as is very evident from the vomiting that ensues on a violent blow or fall on the head. It is shown also in the irritable temper that attends indigestion brought on by improper or badly cooked food, and it is a cause of intemperance amongst

men, who resort to the dram-shop to get rid of the uneasy sensations caused by unwholesome dinners. No doubt a good deal of risk in this respect can be avoided by chewing the food thoroughly before it is swallowed; when this is not done double work is thrown on the stomach, and the whole system is injured by the hurried eating. There is still another precaution to be observed, and that is that work should not be commenced *immediately* after a full meal. When it is remembered that the same brain supplies the nervous power for the stomach to digest the food, and for the arm to wield the mallet or the hammer, or the hand to guide the pen, the advantage of allowing all the available nervous force to the stomach at a time when it wants it most, and not lessening its power by compelling it to supply two functions at once, is obvious.

And now one word before concluding, respecting alcohol, tobacco, and tea. The first is not in any respect necessary for a healthy person. It is of no use whatever in his system, and the only reason that can be advanced in favour of its being taken is that it is pleasant. We mean, of course, taken in moderation, for its excess is always hurtful and often dangerous; but if it must be taken, the time selected should be after the last meal of the day, and it should be diluted with three times its quantity of water. It should, under no circumstances, be taken in the forenoon, as it then overstimulates the brain at its most active period, destroys the appetite, and deranges the whole system. It should never be resorted to to enable great or long-continued fatigue or want of sleep to be borne. Coffee will be found in every respect superior to it for this purpose. To tobacco the same observation applies, with this addition, that it is positively a most dangerous indulgence for growing youths, and smoking in their case should be discouraged by all possible means. At that period of life its continued use—or rather abuse—produces deadly effects on both the heart and brain. Its excess at any age is injurious, but its moderate use in manhood has

a decided tendency to lessen irritation and induce mental repose. It therefore may be said that under those circumstances, and within proper limits, its use is usually harmless, and sometimes indirectly beneficial. Of tea it may be said that it is a grateful and pleasant stimulant, most useful to the well-fed classes when taken an hour or two after dinner, and that when plenty of other nutriment is taken it agrees well as a breakfast beverage. But there is no doubt whatever that when taken habitually several times a day, strong, by people who eat but little nourishing food, or when it is taken in the morning on an empty stomach, it produces grave disorders of the stomach and nervous system. When the usual meal consists of bread and tea, either the tea should be weak with plenty of milk in it, or if the milk is not obtainable, cocoa should be substituted.

The evil which it is capable of causing when taken habitually in excess, or on an empty stomach, is well exemplified in the following case, which occurred in the practice of an eminent English medical writer :—

A servant-girl about thirty-two years of age, in a light place, where she had been happy and enjoyed for some years very good health, with the exception of occasional headaches, latterly began to find that things annoyed her more than they were used to do ; that her temper was not under her control. She had fits also of laughing and crying, and got into a state of great weakness, which she strove to conceal from her mistress by working as usual, but one day trying to clean a grate she fell down speechless and senseless, and had several hysterical fits. She could take no food of any sort. In the words of her physician—"It would seem that for some years she had become more and more addicted to tea-drinking. She confesses to caring for little else, so long as she could get her favourite food—or physic—or poison—I do not know exactly how to call it. Her mistress was quite angry with her for eating so little meat, and with a far-sighted economy

not common in her class of life, took much trouble to keep up the health of a faithful servant. But the weakened stomach refused meat, and she was literally starving in the midst of abundance."

We will conclude with the following recommendations :—

1. See that your food is well cooked.
2. Eat slowly.
3. Rest awhile after meals.

LECTURE VII.

CLOTHING.

"Strange as it may appear, clothes are used equally in cold climates to retain the natural heat, and in warm climates to isolate the body from the surrounding highly elevated atmosphere and burning rays of the tropical sun. The old lady with her wraps of shawls and fur-lined hood wending her way to her whist party in St. Petersburg on a December night, has a strange counterpart in the gallant young European officer mouted on his Arab steed with his head enveloped in turbaned shawls six inches deep, traversing the plains of Hindostan under a burning sun in the month of June; yet both are practical philosophers despite the blow hot and blow cold objection."—*Evory Kennedy.*

THE importance of proper clothing as a means of preserving health and prolonging life was not always very generally recognised, and the most mistaken notions prevailed with reference to this subject amongst the general public from a very early period of our history. One of the common popular traditions gave currency to the erroneous opinion that the ancient Britons had no clothing at all, and in fact were naked savages. This, however, was corrected by Cæsar, who says they were clad in skins, and indeed it is hardly possible to conceive how life could have been preserved in a climate like this, without some artificial provision for retaining bodily heat. Some countenance and apparent corroboration was given to the statement by the fact that tattooing was a common practice amongst them, and devices in various colours were thus figured on the skin of the back and chest, and it was argued that this would not have been done if the parts were habitually covered, and the ornamentation thus rendered practically

valueless. The explanation, however, is to be found in the fact that the tattooing was confined to the males, and that it was their custom to throw off a considerable part of their clothing when entering into battle. Early invaders seeing them for the first time under those circumstances might have easily imagined that this was their usual style of dress, and thus originated the misrepresentation. In point of fact, down to the reign of Edward the First the fashion in clothing seems to have leaned to the side of taste and comfort, and in that reign the ladies' dresses are described in these terms by William de Lorris :—

> "Nulle robe n'est si belle
> A dame ne à damoiselle,
> Femme est plus courte et plus mignotte
> En *surquayne* que en cotte."

It is, indeed, true that so early as the reign of Henry the First there was some amount of tight lacing, which in a poem of the period is thus quaintly alluded to :—

> "Clad in purple pall,
> With gentyll body and middle small."

But it did not proceed to any great extent, and in the following reigns all notice of it is absent; indeed, it may well be doubted whether it had even at the time excited any public attention; if it had it would have been very possibly legislated for, as the laws enacted in those early times with regard to dress are very numerous. That they were well intended, and if carried properly into effect, capable of effecting a great improvement in the public health is not to be doubted. The wasteful extravagance in dress which then characterised the nobility was likely to become ruinous to their humbler, or rather their poorer fellow-citizens, and various old writers remark on the slender raiment and poor character of the covering of those imitators of fashion; whereas by confining themselves to homely woollen materials they could have afforded an ample supply for health and comfort.

The fashion of clothes in England began first to deteriorate in the reign of Henry the Eighth. Under that

monarch's rule ladies were, as Planchè remarks, seen with bare arms for the first time since the ancient Britons. Hall, the chronicler, thus describes their appearance at a banquet on Shrove Tuesday in the Parliament Chamber at Westminster: "The other two ladies were in kirtles of crymosyne and purpull satyn, embroudered with a vynet of pomegranattes of gold; all the garments cut compass-wise, having demy sleeves, and naked down from the elbows." From this period it is evident that in the contest between comfort, common sense, and good taste on the one side, and fashion on the other, the latter was, day by day, becoming pre-eminent. In the reign of Elizabeth the chest or bosom was partially exposed, and so on, step by step, the costume of the court ladies degenerated, until in the reign of Charles the Second ladies were seen with bare necks and arms—in the words of Planchè: "The starched ruff, the steeple-crowned hat, the rigid stomacher, and the stately fardingale, were banished with the gravity and morality of their wearers." There were several attempts made in various reigns to retard this movement towards an uncovered skin, but after a short period of success, the inexorable laws of fashion again forced the court lady or fashionable dame to endure the cold and risk of leaving such a large surface of the skin exposed. Sanitary science, as such, was not then cultivated, or, at least, history is silent on the subject; but ecclesiastical influence was frequently brought to bear on the evil, and the monks and the bishops waged war against it either in vain, or with a success which was only partial and temporary. The want of sanitary knowledge was, no doubt, in those days a cause, and a powerful cause, of many of the evils that then afflicted society, making inroads on the health and peace of families and individuals, numerous erroneous notions being entertained on these and similar subjects. But though these times are so long passed away, it is to be feared that many of their errors, still, in a lesser measure, continue. The delusion, once so popular, that scant clothing of children, reaching in extreme cases almost to semi-nudity, caused them to be-

come hardy, is at last disappearing amongst the educated classes, and the truth is come to be recognised that it was the exceptionally strong children who survived the treatment, while the weaker ones died or fell into chronic ill-health. Amongst the lesser educated classes many grave errors still exist, and will probably continue to exist, until the laws and precepts of sanitary science become more generally diffused than they are at present.

In proceeding to a consideration of the subject, it will be convenient if we briefly advert to the natural sources of heat which influence the temperature of our bodies. They may be said to be principally of two kinds—internal and external. To take the latter first, the sun is the most obvious. Our bodies are heated by his direct rays, by their radiation from the earth's surface, and by the temperature thus given to the surrounding atmosphere. Combustion, as seen in fire, and the consequent radiation of heat, is also another source. These, however, by themselves are very insufficient to preserve the temperature necessary to our health and comfort, and besides, they are frequently unobtainable. Many people at various occupations seldom go near a fire, and life and health have been preserved by bodies of men without any sensible heat from the sun's rays for months together, as in Arctic expeditions. If we refer for a moment to the animal kingdom, this fact will become still more apparent. The polar bear exists for his years of life surrounded by ice and snow, and deprived of any means of direct heat during the greater part of the year. We must therefore conclude that the principal source of heat is internal, and depends upon the vital action of the economy. This is proved by the fact that cold succeeds death, even in an atmosphere that is warm to the living. Debility, also, from whatever cause, produces cold, the extremes of life being very susceptible. A new-born baby will die from slight exposure, and the chilliness of old age is proverbial.

It would serve no useful purpose to discuss in this place the primary source of bodily heat, for whether of nervous

origin or not, there is one leading fact concerning it beyond dispute or cavil, and that is, that it is influenced largely by the respiration. The lungs, as a rule, act rapidly when temperature is raised, the breathing in feverish states of the body, for instance, being accelerated. Again, if active exercise be taken, it will be found that as the number of respirations increase, the temperature rises. Alcoholic stimulants also quicken the breathing, and temporarily exalt the temperature. On the other hand, during sleep the respiration becomes slower, and the bodily temperature declines. The source of animal heat being thus determined, the lungs may be compared to a slow fire, which gives out the heat that ultimately escapes by innumerable heating tubes, filled with warm liquid, and called arteries, to all parts of the body. If from any cause the heat thus generated is excessive, a portion of the fluid exudes through the million openings in the skin, and in the form of perspiration passes off in a palpable or impalpable steam from our bodies. We are thus heating the air around us every moment, and, as has been previously mentioned, altering its density, when it at once ascends and gives place to a cold stratum of air, which in its turn disappears with its modicum of heat into the surrounding atmosphere. This, when it is not of too rapid occurrence, tends to our health and comfort; if, however, the layer of air in contact with our bodies be renewed too rapidly, as, for instance, by the blowing of a cold wind on the surface of the body, the heat is carried away first as quick, and then quicker than it is generated. The temperature of the body falls, the little tubes contract as the fire burns low, and the liquid within them cools, the respiration becomes slower and slower, and if the process is not checked or suspended, the result is death. If a very cold wind blows on a part of the body only, the same phenomena occur over the smaller area—thus, the foot, too long subjected to cold, drops off, and the tips of the nose and ears have often shared the same fate in the icy winds that blow across the plains of Tartary, or in the snowy rifts of the Alps.

The use of clothing, then, is to prevent the heat which is constantly generated within our bodies from being carried too rapidly away, and consequently the substance or fabric that conducts heat badly, or through which heat with difficulty penetrates, is the most suitable material for a cold climate. This very quality also renders it valuable in a way which would be inexplicable without the aid of science, for instance, it tends in many situations to keep the body cool. Thus, in warm countries at noonday, when the vertical rays of the sun strike down with great power, the want is to keep the heat out, and a bad conductor is as useful there for this purpose as it is in the Russian snows to keep the heat in. Hence arises the ingenious parallel quoted in our text, and hence also the flannel costume of the stokers in ocean steamers who are exposed to intense radiating heat, and are in this way enabled to resist it. Ice is well preserved in small quantity by wrapping it in flannel, or straw; and many other examples of this quality might be given.

If we now turn to the main subject of our lecture, we find that it falls naturally under three heads—namely, the material suitable for clothing; the mode of wearing it; and the contrasted effects of proper and improper clothing. But though this is so, in treating the subject, no very arbitrary division is possible, as each part is so closely related to the other. In this country the first requisite in any material for clothing must be that it will enable the skin to withstand the sudden changes of temperature to which it is liable, which in a country like ours constitutes our chief climatic danger. As is said in another lecture, there are 2,500 little filaments of nerves on every square inch of the skin, and it is of the first importance that they should be prevented from receiving the injury caused by a sudden change of temperature. It follows from this that our first consideration must be devoted to the material which should lie next the skin night and day. Linen was for a long time considered, and by many people is still considered, to be the best material for this purpose, but a little reflection will

suffice to show the many objections there are to its use in that capacity. First, it is very cold to the feel, probably because it very readily absorbs moisture from the atmosphere; secondly, it is an excellent conductor of heat, and consequently conveys away the heat generated in the body with great rapidity. Thirdly, it retains the perspiration which occurs during exercise, and when exercise is over, if it is not immediately changed, it feels wet and uncomfortable, and is very liable to give cold. The same objections hold good against its use for sheeting, as it gives the body a most dangerous chill on lying down; and if the weather happens to be wet and the atmosphere moist, the sheets may become absolutely damp. Cotton, the next most popular material, possesses several advantages over linen; the ancient physicians, Albucasis and Rhases, praised it as a material for clothing, and the plant was used in those days as a cure for some cutaneous diseases; but it wears out much more rapidly than linen, and hence is not so generally serviceable. Linen and cotton being thus excluded, we next come to flannel, and here we have a material which combines everything we require as a skin covering in our climate. It is a bad conductor of heat, and therefore it retains heat much longer, so that leaving a warm room and going into the cold street we suffer no chill, and the flannel parts with its heat so slowly that we have time to get up the circulation by exercise before we become dangerously cool. There have been very interesting experiments performed to test this heat-retaining property of flannel. We will give one in which it was compared with both linen and calico. A metal vessel was filled with hot water and covered with flannel, a second similar one was covered with cotton, and a third with linen. The water under the linen took only seven minutes and a half to cool, the water under the cotton took nine minutes and three-quarters, while the water under the flannel retained its heat for twelve minutes and a half. When we add to the foregoing the fact that it has been ascertained by the Registrar-General's returns that since the more general

adoption of flannel under-clothing the mortality from chest diseases has notably diminished, we will have no difficulty in assigning to flannel the first place as a covering for the skin. With regard to the almost universal habit of leaving off flannel in the summer, it may be said with considerable confidence that it is a most injudicious practice. A thinner flannel vest may be used in summer, but it is precisely at this season in our climate that the most sudden changes of temperature occur, and frequently after a very hot day in June the evening temperature becomes suddenly lowered; or again, a hot week is often succeeded by a week in which the weather is very considerably cooler, even in July. A flannel vest, then, of some sort, should be worn next the skin all the year round, and in winter a pair of flannel drawers coming up high round the waist should be added. The protection which this gives against attacks of dysentery or cholera is not the least of its advantages. In summer time a cotton shirt may be worn over the flannel, while a flannel shirt should be worn in winter. This mode of protecting the skin is suitable to all ages and both sexes, and its general adoption would undoubtedly produce a striking improvement in the public health. This improvement would not only show itself in a lessened mortality from those diseases usually produced or aggravated by chill, but the nervous system being saved many shocks from cold (and there is no evil influence of which it is more susceptible), the state of health of the individual would range at a much higher level, and thus he would be less liable to catch fever or other infectious diseases for the reason stated in a preceding page.

Turning now to the material proper for outer clothing, no strict rules need be laid down. A variety of fabrics, all more or less useful, suit the tastes and the means of the various classes in society, the woollen, of course, meeting most favour in the winter. With regard to colour, it may be said that black is the best colour for winter, and white the colour suitable for summer, the former resisting the sun's rays much less than the latter. This was proved by

the interesting experiments of Franklin, who spread out on the snow various fabrics of different colours, and removing them after an interval, he found the snow melted under the dark coloured ones, while it remained unaltered under the white or light-coloured material.

We now come to deal with a most important part of the subject—namely, the mode of wearing clothes, for it may be safely asserted that no matter how carefully selected, however excellent in material the clothes of any individual are, if a bad method of wearing them be adopted, serious and even fatal maladies may be the consequence. To allude to its effects on a large scale, before sanitary science was much attended to, or its rules understood, the ancient leathern stock, which half choked the British soldier of the Peninsular War period, and to which, particularly in hot climates, so many deaths were due, form one example; while the prevalence of heart disease in the British Army, from the Crimea to Magdala, in connection with the pressure of the knapsack supporting-strap across the chest may be perhaps considered another. There is one general rule which may be laid down concerning this matter, and it is this, that all clothing should be worn so as not to interfere with the natural motions of the body either during exercise or in repose. In considering the violation to which this rule is subject, tight lacing as a means of beautifying the figure at once suggests itself. This evil has been so often and so ably combated that we do not consider it necessary to dwell upon it here, the more so as it is certainly less prevalent than it used to be, and is decidedly become unfashionable, which, perhaps, to those likely to become its victims, is the most powerful argument against the practice. To say that it renders the breathing short, exercise consequently a disagreeable labour, instead of a pleasant recreation, shoves down the liver out of its place, and injures appetite and digestion by compressing the stomach, while it sometimes brings on alarming palpitations by interfering with the heart's action, is perhaps not so important as that it indubitably and inevitably produces a red nose. This is

caused by the congestion which occurs in the terminal arteries, or capillaries of the skin, by the difficulty the blood has to return to the heart owing to the pressure round the waist. The same state may be seen under the nails and at the finger-tips. When the congestion continues any time, the colour usually remains permanent. Fortunately, the days of stiff collars and high neckcloths are departed—let us hope for ever. But if we look to the other extremity of the body, we are very far from obeying the rules we have laid down. The feet are still confined, perhaps a degree or two less than Chinese women, but still considerably hampered in their natural and healthful action. Here, again great evil results from an apparently trifling cause. Exercise which is so all-important to the health is so unpleasant, and in many elegant boots so absolutely painful, that it is avoided as much as possible, corns are produced in luxurious abundance, and though proverbially useful as barometers, it is doubtful whether their advantages in this respect are not overbalanced by the injury to the health and temper they so frequently cause. Boots are made altogether too narrow. The bootmaker takes the measure, not in the natural position of the foot with the sole on the ground, and the whole weight of the body supported on it and flattening it out, but with the foot raised off the ground, when its muscles not being in action, it is considerably narrower than it is in the natural position. There are, however, some indications of a better shape being adopted. Square toed boots are much superior to those in ordinary use, and should they become fashionable, as at present seems likely, we would have soon no further complaint on this head. With regard to the absurd high heels which threatened a short time ago to throw the fashionable lady on her face when she walked, and to inflict irremediable injury on her spine, unless her muscles were particularly strong, they are so rapidly disappearing that we can happily dismiss them with this brief mention; and here it will not be out of place to recapitulate briefly the proper covering for the feet. It should be capable of preserving

the feet at all times warm and dry. To fulfil the first indication, woollen stockings are necessary in winter, and they should be always changed after exercise, or the feet are liable to grow cold; cotton stockings will suit for summer very well. Boots should, for walking in this climate, have thick soles, and they should be laced up in front with a continuous leather tongue underneath the lace, so that the foot could be plunged into water to the level of the ankle without running the risk of any moisture penetrating. It need not be feared that soles, even an inch thick, will be too heavy for walking; on the contrary, the thicker the sole, the easier, so to speak, is the spring in it, which renders motion extremely light, and increases the elasticity of the step. In wet weather boots should be immediately changed on coming in doors. It should be remembered, that of all the secondary precautions by which health may be preserved, there is not one more important than keeping the feet warm.

If we now refer to the head covering, we do not find much to complain of with the single exception—to be sure it is a large and important one—of ladies' bonnets. They have gradually grown so small that one is now tempted to ask why they remain at all. There is here no evil to the robust country girl who all day in the fresh air is accustomed to constant blowing on her head and neck; but the case is different indeed with the inhabitants of towns, factory girls, dress-makers, and even young ladies of fashion; and it is in some measure owing to this hurtful practice of leaving the neck and head exposed that attacks of painful neuralgia of the head and face have latterly become so much more common amongst those classes. It would be futile in the face of the present fashionable style of head-dress to advise a return to the neat comfortable bonnet of some eight or ten years since, but it may be of service, if we cannot remove the cause of the disease, to recommend a very efficient prophylactic. Those who wear such bonnets should bathe the forehead, face, and back of the neck every morning in a basin of cold water, to which

a tablespoonful of common salt and a teaspoonful of vinegar should be previously added. After bathing thus for a minute or two, the parts should be rubbed well dry with a rather coarse towel. This will in the vast majority of cases prevent the evil results above mentioned.

Another rule, which applies very generally, may be mentioned here; it is that belts or ligatures round the waist should be as much as possible avoided. The point of support for the dress should be sought from the shoulder.

If we now contrast for a moment the effect on the body of proper and improper clothing, it will be sufficient to convince us of the importance to health and life of sound views on this matter. Examples of the effects of insufficient clothing are every day seen in our hospitals, where many poor people are constantly admitted suffering from various chest diseases caused by cold and wet. Many others fall victims to rheumatism from a similar cause, and this arises not so much from want as from ignorance as to the evils of wet feet or wet clothes, and consequent neglect in changing. Here also we may see how the neglect of a physical precept produces a moral evil, for there are many women of the humbler classes who—having clothed themselves in tawdry finery, and spent the money on ribbons and false lace which would have amply sufficed for comfortable flannel—when they get wet and cold resort to the dram-shop, to supply by artificial means the warmth their wretched clothing is unable to afford. Thus disease, pauperism—and death is often the result of an ignorance of the sanitary precepts in this matter. But can we say that it is the women of the humbler classes alone that err in this respect? Unfortunately, we cannot. Women of the highest rank now go to balls and assemblies dressed in a way which renders it difficult for them to escape some one or other of the multifarious diseases which attack the chest and air-passages. The whole skin of the neck and upper back, with a good deal of the chest, is exposed to any chance current of air that may find its way into the

heated room. Here, again, fashion is inexorable; but it is to be hoped that when the deaths that are clearly attributable to this custom are more carefully recorded, the good sense of the public will assert itself against this needless and foolish sacrifice of life and health. On the other hand, if an even temperature be preserved by proper and sufficient clothing, the free circulation, the clear healthy skin, the bright animated countenance of health and consequent good temper give a certain and no small portion of beauty to the plainest face, while the mind, undistracted by the pangs of tight lacing, or of feet tortured by pressure, will unconsciously distribute some portion of its own cheerfulness and content around it.

Though the principal use of clothing is to retain bodily heat, in our humid climate it is constantly called upon to supply another serious want—namely, to keep out the wet, for wet produces by its evaporation, when in contact with the skin, a very low temperature, and is consequently to be avoided as far as possible. If we look for a moment to the means of protection Nature has provided for creatures who by their instinct, habits, and mode of livelihood are frequently exposed to the contact of water, while yet they are warm-blooded, like ourselves, and are inhabitants of dry land, we will have no difficulty in at once selecting the most suitable fabric for our purpose. Ducks, geese, sea-birds, and water-hens have an oily secretion or fluid which constantly runs along their feathers and renders them impermeable to wet. We then conclude, oily or greasy material of some sort is the most suitable for our purpose, and we have this offered to us in the shape of an ordinary oil coat; but we must perceive, on a slight examination, that this by no means fulfils all the conditions of the waterproof clothing of a duck or water-hen. It keeps out the water, indeed, quite as well, but it does not let in the air. Every oily feather on the duck's body has an opening above and below it, in other words, between itself and its neighbouring feathers on either side, to admit the air, and we require an equally free supply of air to our

skin to carry off the insensible perspiration continually occurring. In oil coats, as made at present, this is only very partially possible through the skirts, and, in a lesser degree, the sleeve and neck openings. If exercise be taken we will find that the perspiration settles on the surface of our inner porous woollen cloth coat in little drops, like the contained steam on the inside of the lid of a kettle or teapot. The remedy for this is simple and feasible. They should be made with numerous ventilating gussets looking downwards to let in the air, something in the style of the leathern armour worn by Harold's soldiers, which was constructed of "overlapping flaps, generally stained of different colours"—though this direction might be omitted —"and cut into the shape of scales or leaves." If this was done they would become quite unobjectionable; they would be worn with feelings of comfort, rendered impossible by their present construction, and their use would be no doubt vastly extended amongst the community.

We have already alluded to the fact that the bodily temperature falls during sleep, and this almost everyone has experienced on nodding in the day-time on a sofa without any covering in addition to the ordinary dress. It will be therefore easy to understand that the night clothing must be heavier in proportion than that worn in the day-time, and the principal difficulty met with in adjusting the proper amount is to combine lightness with warmth. The blanket, which should be of fleecy soft wool, and double, is not enough, especially in winter, and here we would particularly insist on the necessity that there is for plenty of clothing at night, so that fresh air may be freely admitted to the sleeping room. A quilt similar to that in general use in Germany, made of eider-down, is very light and warm, and would be very suitable when it can be obtained; its artificial substitutes are, however, quilted, or sewed all over and through and through, and though they retain heat, they do not admit air, and are consequently soon soaked through with the organic matter of the perspiration. It is hardly necessary to say in this place that

all bedding and bed-covering, of what nature soever, should be freely exposed to the air in the day-time, opposite open windows, and the bed should never be made until an hour or two previous to the time fixed for retiring. These precautions being observed, the sleep enjoyed under such conditions will be really what the poet phrased it—"Sore Labour's bath; balm of hurt minds; great Nature's second course; chief nourisher in Life's feast"—and will save many minor ills and grave discomforts to those who sedulously observe them.

LECTURE VIII.

CLEANLINESS.

"The most ignorant person is convinced that the proper care of the skin is indispensably necessary for the existence and well-being of horses and various animals. The groom often denies himself sleep and other gratifications that he may curry and dress his horse sufficiently. If they become meagre and weak, the first reflection is, whether there may not have been some neglect or want of care in regard to combing them. Such a simple idea, however, never occurs to him in respect to his child. If it grow feeble and sickly—if it pine away and is afflicted with disease, the consequence of dirt, he thinks rather of witchcraft and other absurdities than of the real cause—neglecting to keep the skin pure and clean. Since we show so much prudence and intelligence in regard to animals, why not in regard to men?"—*Art of Prolonging Life.—Hufeland.*

In this lecture it will be necessary for us to begin by trying to learn something of the anatomical structure of the human body. To give even the faintest outline of its principal parts would far exceed the space we can command, and, fortunately, it is not necessary we should attempt it; but having premised that which in the present day is known to all—namely, that the heart propels the blood, that the brain supplies the nervous force, and that the lungs supply the air necessary for life, we will enter boldly into the interior of this mysterious temple, the living man, and observe what we see. Excluding the great organs from our notice, and gazing into the central sanctuary of the chest, we perceive two great tubes and a series of cords running down beside them. One of these tubes absorbs all the nourishment required for the support of the body, and casts off all the waste or injurious materials; the second

carries the blood to feed the numerous pipes or arteries that run in every direction through the body; and the cords convey the nervous force or influence from the brain to govern their movements and direct the course of all. Going outside these three we meet the bones, strong, elastic, silver-banded, and braced together to protect the parts within; outside of these the flesh, which, moulded into various forms or muscles, fed by the blood, and directed by the brain, moves the limbs, alters their position—now passing as pulley ropes from one point to another, to change the direction of a part, as in the eye, or lifting a weight, as in the leg—now by its contracting power enabling us to grasp, as in the hands, or with inconceivable delicacy and rapidity forming the multitudinous sounds of human language in the tongue. Outside of all we have the skin, smooth, soft, elastic, shining like satin, embracing and protecting all the rest from injury.

Now, if we place the point of a needle on any single spot on the whole wide surface of the skin, and push it in, we at once penetrate two tubes and a cord, again, one tube conveying blood, a cord conveying nervous force, and a tube which expels matter that is hurtful, and absorbs matter that may be useful to the body.

No more wonderful instance could be adduced of the power of God and the marvellous nature of His works than this extraordinary multiplication of the same type so many millions of times.

When we have learned the fact that modern science has supplied us with—namely, that there are over 2,800 of these little tubes to the square inch, with a corresponding number of nerves and blood vessels, the intellect almost refuses to comprehend it. Now, it will be apparent from the foregoing facts that the skin, being provided with so many millions of nerves, is highly sensitive; and when we learn that the more important the duties of any organ are in the animal economy the more nerves it possesses, we must conclude that the duties performed by the skin are of a highly important nature. That this is so is made apparent

enough from the consequences that follow even a slight injury to it, if that injury is any way extensive; thus, if a child is slightly burned, even if it is only just a blush over any large surface of the body, as the chest or abdomen, it usually dies in two or three days, sinking with all the symptoms it would display, if it received some dreadful mutilation, as, for instance, being run over by a railway carriage, or having its limbs lacerated by machinery.

The great function of the skin is to remove from the body, through those little tubes or pores, matters which would be deleterious to the health or life if allowed to remain. This it effects constantly by means of perspiration, and this perspiration is always going on, even when it is not perceived. When the body is warm with heat or exercise it flows out, but at other times it dries on coming into contact with the air, and forms over the top of the little tube or pore a fine white crust or flake. This in the scalp is easily seen, and is called dandriff; it, however may be rubbed off any part of the body. Now it will be easily understood, that if the skin is allowed to become dirty, those little holes or pores will be stopped up, and results will ensue, serious in proportion to the extent of the stoppage. If they are all stopped up, the result is death, and of this a melancholy instance occurred some years since in Paris. It is the custom in that city during the *Fête de Bœuf Gras*, to parade a big bull through the streets, on which a little boy rides dressed as a Cupid. On the occasion alluded to, the managers of the festival conceived the idea of gilding the little fellow all over, so as to make him look like a living brass or golden figure. They accordingly did so, but in doing so, they stopped up all these little holes or pores in the skin, and before they were able to get off the stuff, the poor child was dead. Children of the poor, in whose skins these little holes are kept partially closed by dirt, often get loathsome and sometimes fatal disease. The mothers mourn, and weep, and wonder, when they could have prevented the evil by the timely use of

soap and water. Even when matters do not go so far, it will be easily understood that so large a portion of the skin being covered with dirt, and so many nerves subject to its evil influence, constitutional mischief often results. The children get muddy complexions, become pale, spiritless and sullen, and either die from some acquired scrofulous affection, or from some of the ordinary diseases peculiar to childhood, from which they would have recovered if they were in a healthier condition previous to the attack.

Here, again, the violation of the physical law "Keep the skin clean," is followed by moral evil of a most serious nature. It often happens that through their bodily weakness and debility, they lose all relish for those active, healthy sports usually so much loved by young people, and the brain rendered prematurely excitable, they fall into vice at the very first exposure to temptation; and, morever, frequently become vicious, without either knowledge or intention, until, bad habits being formed, their knowledge of the evil comes too late to save them from its consequences. Now, this is a dreadful consideration, and should be sufficient to make those who have the care of children, or who have influence or authority over such as have that care, to see that the personal cleanliness of the child is attended to. When such a simple proceeding as washing a child all over thoroughly twice a week, in soap and warm water, has so important an influence on its present health, and often on its future happiness, its neglect would seem to be inexcusable.

Children, however, are not the only persons who suffer from neglect of the skin. Leaving aside, as unsuited to the scope of these lectures, the diseases that neglect of the skin engenders in tradesmen and artisans of various kinds, it is still beyond doubt that many persons lose their health and strength from this cause. The sudden checking of the perspiration that ensues by going from a heated atmosphere into the cold of the street without sufficient protection, is in a high degree dangerous. The continued endurance of a low temperature, as sitting for hours in a

cold room, is also productive of much evil; for when it is remembered what a powerful agent cold is in depressing nervous energy, and when we consider the immense number of nerves in the skin which are subjected to its influence in this way, its power for evil will appear very obvious. The growing taste for showy apparel amongst women and girls of the humbler classes is productive of much harm, and dispensary physicians have often had occasion to remark the many evils that spring from spending money on finery that should be spent on flannel.

The means by which the skin can be kept in order are few, simple, and well within the reach of all. In the first place, the whole surface of the skin must be well washed with soap and warm water, at least once in every week. It would, of course, be well to take a daily sponge bath of tepid or cold water, but this is not possible to every one. There is, however, a substitute that answers nearly as well —namely, the flesh-glove, which should be used every morning before rising, and before getting into bed every night. A minute or two spent in rubbing the skin briskly, will suffice to remove the minute scales that obstruct the pores, at the same time that it gently stimulates and invigorates the nerves of the skin, and diffuses all over the body a pleasant healthy glow. It prevents the chill which some persons are subject to when getting up in winter, without a fire in the room, and an increase of appetite and cheerfulness is felt when the plan has been steadily pursued for some time. Draughts should also be guarded against, but not at the expense of fresh air. They should be met by more or warmer coverings; indeed, it may be said that, if there is no strong special reason to the contrary in the individual case, flannel should be always worn next the skin, in the day time, by both young and old.

It has been objected by those who, otherwise fairly intelligent, dispute in these days the usefulness of sanitary precautions, that the agricultural labourer seldom washes himself from head to foot, and that notwithstanding, he lives to a good old age, and mostly enjoys very good

health. The answer is very simple. Washing the skin is an expedient adapted by our own intelligence to the state we live in, in our present over-crowded modern life in towns. It is not so necessary to the country labourer. He, obeying literally the command "Earn thy bread in the sweat of thy brow," obeys also at the same time the great physical law "Keep the skin clean." All the muscles of his body being called into vigorous action at his daily labour, project under the elastic skin, and by their frequent motion rub it well on the *inside*, clearing out the little tubes or pores by their pressure, and stimulating the nerves very thoroughly; while his occupation being always in the open air, the perspiration is carried off by evaporation.

As an illustration of the powerful effects which can be produced by the scientific application of water to the skin, under diseased conditions, the following case is in a high degree valuable and suggestive: A gentleman some years ago sickened with a severe attack of small-pox. Everything that the highest medical skill could suggest was carefully and sedulously administered, but, despite of it, he got worse and worse from day to day, until at last his life was despaired of. He had lost his senses, and was raving and tossing about from side to side, without rest or intermission. In this emergency, one of the physicians in attendance reflecting that the whole skin was involved in the disease, suggested that they should try a medicine that would reach at once to all the diseased part. It was at once agreed to, and he was immediately ordered a bath of warm water. Scarcely was he placed in it, when his raving ceased. He cried out: "This is Heaven; why did you not do it before." Gentle sleep soon took the place of the former restless tossing, and all his symptoms became considerably ameliorated. He was kept in the bath for a considerable time on the first occasion, and it was afterwards frequently repeated with the best results. He was finally completely restored to health.

But if thus valuable in sickness, it is at least reasonable to suppose that it would prove equally valuable in health.

Indeed, the advantage of bathing cannot be too strongly or too frequently insisted on. As we have just mentioned, there are numberless little tubes continually occupied in casting off worn-out or poisonous materials from the body; their aggregate number has been estimated to be seven millions, and it would seem to need little argument to prove that the keeping of all these little orifices perfectly free must produce an excellent result on the health. The body gets rid of about three pounds weight of matter daily through those little tubes, and a very partial reduction of this amount will have a decided evil effect, and if long continued, may lay the foundation of chronic disease in some internal organ.

As regards the frequency of ablution necessary to keep the skin in a healthy state, Mr. Wilson thus writes: "The face and neck, from their necessary exposure to the atmosphere, and the impurities which the latter contains, cannot escape with less than two saponaceous ablutions in the twenty-four hours; the feet, from the confined nature of the coverings which are worn over them, require at least one; the armpits, from their peculiar formation in reference to the detention of secretions, and also from the peculiar properties of the latter, at least one; and the hands and arms, as many as nicety and a refined taste may dictate. No harm can arise from too frequent ablutions; much evil may result from their neglect." The sedentary worker in large towns or cities, deprived to a great extent of open-air exercise, and submitted to an atmosphere loaded with floating impurities of many kinds, has now an excellent resource in the Turkish bath. It is often very difficult to clean the skin thoroughly, even with soap and water, after any long absence from the bath. This is partly due to a secretion of the skin, which is constantly exuding on the surface and which is of an oily or greasy nature, more marked in some persons than others, but which is present to some extent in all. It adheres very closely to the scurf or superficial skin, and serves, no doubt, a useful purpose in preventing the too free exuda-

tion of the fluids proper to the body, while, on the other hand, it hinders a dangerous absorption of foul or irritating vapours with which the skin often comes in contact, and which, if freely admitted, would cause disease or even death. The Turkish or hot-air bath, by inducing a most profuse perspiration, thoroughly clears off all that is superfluous of this, along with the superficial layer of scurf skin to which it is agglutinated. The bath, however, is not suitable for everyone, and by invalids, or those in a low state of health, should not be taken without medical advice. The following graphic description of the bath is from the pen of Dr. Mapother, and is very valuable as an accurate record of his own personal experience of the process :—

"The baths introduced into this country in 1856 from the East, under the name of the 'Improved Turkish Baths,' have been regarded as more analogous to the old Roman bath than to the Oriental hammam. Although a description of it may seem unnecessary, as there must be few, if any of my hearers who have not undergone its operations, yet that will be the readiest method in which I can offer my opinion on the subject, making any comments I think suitable at each step. The first room you enter is as cool as the outer air, and here you undress and afterwards dress again, so that from these circumstances the Romans termed it the *frigidarium* or *vestiarium*. Swathed round the waist by a light cloth, and with clogs to prevent your feet being burned by the heated tiled floor, you enter the second room or *tepidarium*, heated by flues carried under the floor to from 110° to 120°, as the thermometer in it informs you. The admission of pure air and the expulsion of impure is accomplished by ventilators in the opposite walls near the ceiling; and, unless this is carefully attended to, the hour will be by no means healthfully spent. The windows fitted with stained glass to produce a tinted twilight are in the roof, which partakes of that Saracenic character of architecture on which the whole building is constructed. There are a central seat and several couches of marble, with mat-

tresses, on which you spread the sheet given to you. Although there is no direct method of charging the air with moisture in this department, it must enter from the inner room, and basins of water with which you are advised to wet your hair, the only part which feels hot, are usually left in it. The sensations in this room are agreeable nearly to every one, and those to whom they are not are probably those to whom, as I shall tell you, the bath is unsuited, and they should retire to the cold room at least for a while. My pulse usually rises four beats here, and often twenty in the warmest room, and the respiration becomes a little hurried; but these effects diminish, when a general perspiration breaks out in some twenty or thirty minutes, and you are thereupon fit to enter the *sudatorium*. The air in this last chamber is heated to about 140°, and is charged with moisture, though not visibly so, from the washing places which adjoin. In the hammam the temperature of one room is over 200°. I think it would be well to have vapour equally distributed by a spray jet of warm water, and regulated by the aid of the hygrometer. Strange enough the other secretions are not lessened, although so much fluid escapes from the skin. The attendants are so much exposed to a high temperature that they do not require heat-giving food, and lean meat is what they care for. Their employment does not seem to injure their health. I know one fellow who has been about eight hours daily for over eight years in the bath, and he is healthy and muscular. It appears from the writings of Galen that the Romans took care to have the air of the *sudatorium* moist. The heat in this room feels to many oppressive, and with others sweating becomes profuse. The curious operation of shampooing is performed here. You are stretched on a couch, and every part of your body is kneaded, squeezed, rubbed, or pulled, till your joints crackle and become so pliable, that you feel that you are really being dislocated. So relaxed is the system, that these operations which under ordinary circumstances would be intolerable, are really agreeable. A surprising quantity of

scurf skin, which no washing could remove, peels off, especially if a glove of camel's or goat's hair be used, as they are in the East, where also the soles of the feet are scraped with pumice. The deposit of this skin of only a week's date, when collected, is often as large as one's fist. You are then dashed with warm water and lathered with soap, applied with a wisp of lyf, the woody fibre of the Mecca palm, and finally washed clean by tepid, and afterwards cold water issuing from a rose with a flexible tube. Adventurous bathers often take a cold douche, or even, some closely copying the Romans, try immersion in cold water 'to close the pores;' but some means of restoring one to the normal temperature is indispensable. From this *lavatorium* you are rapidly conducted to the first room, where, wrapped in your sheet, you recline on a couch or duretta, shaped like a spread out W, till quite cool, when you slowly dress, for any hurry or exertion is apt to bring out perspiration, which makes you liable to catch cold—a properly-conducted bath, however, having no such effects."

The skin also enables man, by the functions it fulfils, to endure the extremes of heat and cold, to inhabit all regions of the earth, and to preserve his health in every variety of climate, from the cold of Siberia to the intense heat of the African desert. It is here worthy of note that the monkey tribe, which most closely resembles man in form, and whom some modern doctrinaires of science would have us believe is nearly related to him in organisation and structure, is less able to bear changes of climate than most other animals. The profuse nervous supply of the skin enables it to resist the cold temperatures of northern climes, while in tropical heats the evaporation of the profuse perspiration that takes place when the body is subjected to their influence, lowers the surface temperature considerably. The power of the human skin to resist extremes of heat is shown in the fact that men have frequently entered an apartment heated above the temperature of boiling water, and remained there a considerable time without inconvenience. Meat has been baked in those temperatures while the man

has remained quite uninjured. That this effect is produced by the continual evaporation of the perspiration is proved by the fact that if the air be rendered moist, and consequently unfavourable to rapid evaporation, the same temperature cannot be endured for a moment, and a temperature only one-third as high is endured with difficulty.

That the skin has a close sympathy and connection with the internal organs of the body has long been a matter of experience. The sudden redness it assumes in the phenomenon of blushing proves its close and intimate relation with the brain and its functions. The sympathy it constantly displays with great disturbances in the economy is shown by its being the seat of the eruption in fevers of various kinds, as small-pox, measles, scarlatina, &c., while the almost instantaneous effects produced on it by certain articles of food taken into the stomach have been frequently remarked. In some persons a lobster salad will produce a close red eruption all over the body within fifteen minutes after it has been eaten, interspersed here and there with elevated angry-looking wheals, while a great deal of tingling and smarting accompanies the phenomenon. White of egg has caused a similar train of symptoms in another case. Substances used in medicine, sometimes, in certain constitutions, give rise to results closely resembling those here alluded to. A familiar example is the affection called "quinine rash." A case has been recorded by the author in the *Monthly Journal of Medical Science*, where the administration of a few grains of sulphate of quinine was followed by a close red rash, smarting and itching, which after two or three days faded and was succeeded by desquamation of the cuticle, the skin peeling off in the same way as after an attack of scarlatina. In none of these cases, however, was there any permanent evil result. The skin has also a very great influence on the lungs; indeed, so close is the connection between them, that the skin has been called a third lung, and with a considerable show of reason, for they both continually exhale carbonic acid and organic matter, and they have been observed to show a

very close sympathy in diseased states of either. This has led, and justly so, to the well-directed efforts which have been made of late years to exert an active influence for good on chronic lung disease by means of the skin. Many successful cases have been recorded, but the following account by Dr. Coombe of his own case is peculiarly interesting, as being written by a well-informed and observant physician concerning himself. He says: "The writer of these remarks has unfortunately for himself had extensive experience in his own person on the connection between the state of the skin and the general health, and especially the health of the lungs, and can therefore speak with some confidence as to the accuracy of his observations, and the benefit to be derived from attending to the condition of the skin in chronic pulmonary complaints and indigestion. Many affections of a consumptive character are preceded or begin by deficiency of vital action in the skin and extremities, and a consequent feeling of coldness in the feet and on the surface, and susceptibility of catarrhal affections from apparently inadequate causes, often long before any pressing symptoms directly connected with the lungs occur to attract notice. In this state, means systematically directed to restoring the cutaneous circulation will frequently be successful in warding off consumption, and even when the disease is formed, the same means will help to prolong life and relieve suffering. The writer became ill in the month of January, 1820, and soon presented many of the symptoms of pulmonary consumption. In spite of the best advice he continued losing ground till the month of July, when he went by sea to London on his way to the south of France, but finding himself unable for the journey, he was obliged to return from London, also by sea. Being extremely liable to sea-sickness, he was squeamish or sick during the whole of both voyages—so much so as to be in a state of gentle perspiration for a great part of the time. After this he became sensible for the first time of a slight improvement in his health and strength, and of a diminution of febrile excitement. Some weeks afterwards

he embarked for the Mediterranean, and encountered a succession of storms for the first four weeks, two of which were spent in the month of November in the Bay of Biscay in a very heavy sea. For more than three weeks he was usually very sick, and always in a state of nausea; and during the whole time, though his bed was repeatedly partially wetted with salt water and the weather cold, the flow of blood towards the skin was so powerful as to keep it generally warm, always moist, and often wet with perspiration, forced out by retching and nausea. The result was that on entering the Mediterranean at the end of a month, and then meeting fine weather, he found himself, though still more reduced in flesh and very weak in every other respect, decidedly improved; and on his arrival in Italy at the end of seven weeks, recovery fairly commenced, after about ten months' illness; and by great care it went on with but little interruption till the summer of 1821, when he returned home. To carry on what was so well begun, riding on horseback in the country was resorted to, and that exercise was found to excite the skin so beneficially, as to keep it always pleasantly warm and generally bedewed with moisture, even to the extremities of the toes; and in proportion to this effect was the advantage derived from it in relieving the chest, increasing the strength, and improving the appetite. A second winter was spent in the south with equal benefit, and in the summer of 1822 riding was resumed at home, and the health continued to improve. The excitement given to the skin by riding was sufficient to keep the feet warm and to prevent even considerable changes of temperature from being felt, and rain was not more regarded, although special attention was paid, of course, to taking off damp or wet clothes the moment the ride was at an end. Strength increased so much under this plan, combined with sponging, friction, and other means, that it was persevered in through the very severe winter of 1822—23 with the best effects. For nine years thereafter the health continued good under the usual exposure of professional life; but in 1831 it again gave way, and pulmonary symptoms of a

suspicious character once more made their appearance. The same system was again pursued, and the same results have again followed the invigoration of the cutaneous functions and of the general health by a sea voyage, horseback exercise, and the regular use of the bath. These, as formerly, have proved beneficial in proportion to their influence in keeping up warmth and moisture of the surface and extremities."

While thus dwelling on the great influence for good obtained by the proper action of the skin, he does not ignore the fact that other circumstances contributed to the fortunate result, for he says: "In thus insisting on the advantages of maintaining the healthy action of the skin, I must not be supposed to ascribe the whole benefit to that circumstance alone. As I have already repeatedly had occasion to observe, it is impossible to use rational means for the invigoration of one organ or function without good being done to all."

The effect of sunlight on the skin has latterly attracted some attention, and it has been maintained that as plants deprived of it get pale and watery, that its loss or absence is a cause of a good deal of ill-health and pallor of the inhabitants of overcrowded towns. It is, however, more likely that the state of the atmosphere has more to do with this than the presence or absence of the sun's direct rays. The sunlight could, after all, in the vast majority of cases, act only on the small surface of skin covering the face and hands. Of course, its indirect influence in purifying and drying the atmosphere cannot be over-rated. There is no doubt that the nutritive processes are greatly affected by the state of the skin. Horses, when neglected or badly groomed lose flesh, as appears from our text, and the same is true of many other animals. The prize beef, stall-fed, are regularly groomed and brushed during the process of fattening for the Christmas markets, and their stalls and houses are kept scrupulously clean. What is proved to be such an aid in the nutrition of the lower animals is also found by experience to be true when applied to man. The healthy ap-

pearance of the children in Irish workhouses who never taste meat, and who have a very plain and not too profuse a diet, when contrasted with young people of a similar age and class living in the back streets of large towns, who are probably much better fed, but whose cleanliness is much inferior, is a case in point. In reference to this matter Chadwick says: "Skin cleanliness augments the nutritive effects of food. It has been found on positive comparison of results with the same quantity of the same food, that pigs that are subjected to regular skin cleaning by being washed put on one-fourth more flesh than pigs that are unwashed, and that the pork of the washed pigs is the finest and the best eating. It should, therefore, be preached to the poor, as an additional inducement to skin cleanliness, that the same food which is required to make four children that are kept dirty thrive, will serve to make five thrive whose skins are daily washed and kept clean." Regular exercise is also absolutely necessary to the health of the skin, and it is recorded that Byron could not get rid of his fits of indigestion, by fasting and cold water, until he also increased the action of his skin by a sparring match.

The appendages or outgrowths of the skin, the hair and nails, may be here alluded to. The latter are often a source of trouble, particularly on the toes, from the unnatural pressure they are so frequently subjected to by ill-made boots, joined, no doubt, also in some instances to want of care and attention. By keeping them most scrupulously clean, and always cut *straight across the top*, a great check may be given to any tendency to ingrowing, while, of course, properly made wide-toed boots should be worn.

The hair should not be subjected to much rubbing or pulling by racks or combs. The scalp is served by being rubbed; the hair injured. Greases or pomades should be avoided, the best wash for the hair being tepid water in which a little common soda has been dissolved. Hair dyes, it should be remembered, are often dangerous and occasionally destructive.

In everything that has been said about baths and bath-

ing, it must be remembered that these observations do not admit of indiscriminate application. The majority of people are braced up and improved by a daily cold bath, and regain their elasticity and vigour after the shock as readily as a worn-out piece of india-rubber regains its elastic properties on being immersed in cold water. Some people, however, are chilled and weakened, instead of being warmed and strengthened by the cold bath, and it is manifestly unfit for them, except under medical superintendence. The tepid bath will probably prove more suitable in these cases, but when any degree of deranged health is present, no bath should be taken without consulting a physician. The general public are unfit to judge in matters of this kind; even the most enlightened of them adopt the strangest theories in matters concerning their physical health, and carry them to the most absurd extent—as for instance, Burke's habit of drinking large quantities of boiled water, which he supped up like soup, pressed on his acquaintances, and considered a sovereign remedy for all human ills. No particular rules can be laid down safely, except by the patient's own medical adviser. Cleanliness is, however, a general rule applicable to all, whether by baths, clothing or brushes; and health, perfect and entire, cannot be maintained without it, while the gravest and most severe illnesses may be often alleviated by its constant preservation. The old proverb tells us it is next to Godliness, and there is considerable justification for the fancy, in the fact, that it is mostly found conjoined with industry, sobriety, and morality, and commonly separated from idleness, intemperance, and vice. That it preserves that most valuable of qualities, self-respect, is undeniable, and that its practice gives its modicum of aid towards the success of individuals, and even nations, is a well-founded opinion. "Offsets of the same barbaric stock," says Planche, "a species of family resemblance had always existed between the Saxons, the Danes, and the Normans; but the residence of the latter in France, and their expeditions to the Mediterranean, had materially improved their character and manners, and

while the Danes continued pirates, and the Saxons, originally the fiercest nation of the predatory north, had sunk into a slothful and unwarlike people, the Normans became distinguished through Europe for their military skill, their love of glory, their encouragement of literature, the splendour and propriety of their habiliments, the *cleanliness of their persons,* and the courtesy of their demeanour," and this at a time when all the surrounding nations were either ignorant or totally neglectful of cleanliness of any kind.

But it is during epidemic seasons that cleanliness is most valuable. The skin has been elegantly called the sentinel, placed by the Creator to guard the body from attack, giving it notice by pain of the slightest injury. In our times, indeed, the post is assailed, not by ordinary violence, but by violence of a craftier and more treacherous soil, but even here, with proper aids, the sentinel will not be found unfaithful. Neglected, overlooked, unrelieved, he may indeed fail to prevent the entrance of the enemy, but by ordinary care and by using the means of defence already detailed, no danger need be apprehended. Of this we have a forcible example in Dr. Desgenettes, of whom it is recorded, that he lived through a service amidst the most pestilential atmospheres of cholera patients in Egypt, and Professor Padel, who served through the epidemics of cholera and of typhus which had ravaged Florence, and who attributed their escape mainly to frequent complete ablutions with water mixed with vinegar, and to a daily change of their clothes, which they had then fumigated.

M. Grimaud regards these precautions as a discovery in the science of prevention, and asserts that one may nearly always guard himself against contagion, and pass his life amongst the sick with impunity during the most terrible epidemics, prevention having now become "Au fond une affaire de toilette et hygiène privée." We will, therefore, conclude with the following recommendations :—

1. Wash the whole skin every week with soap and water.

2. Take a daily cold or tepid sponge bath, or, if this is impracticable, rub the skin for a few moments with the flesh-glove or a coarse rubber every night and morning.

3. Wear flannel next the skin.

LECTURE IX.

SANITARY SCIENCE IN RELATION TO THE TRAINING OF THE YOUNG.

"Taking the word hygiene in its largest sense, it signifies rules for perfect culture of mind and body. It is impossible to disassociate the two. The body is affected by every mental and moral action ; the mind is profoundly influenced by bodily conditions. For a perfect system of hygiene, we must combine the knowledge of the physician, the schoolmaster, [and the priest, and must train the body, the intellect, and the moral soul in a perfect and balanced order."—*Parkes on Hygiene.*

THERE is no more important division in the wide domain of sanitary science than that which relates to the training and education of the young, for as the boy is father to the man, the present youth of the country are her future people, and to them must be committed hereafter her destinies. On their training it depends whether she shall be great, wise, and powerful amongst the nations, or whether she shall fall from her high estate and drag on at best a mediocre and unhonoured existence. Now, with regard to many evils and abuses long continued and oppressive, we are often powerless to avert or remove them, through the immense difficulty the passions and prejudices of men offer to enlightened efforts for their improvement. Here, however, whatever difficulties—and they are neither few nor small--present themselves for solution, we have not these two great foes to all human progress to encounter. The minds of children are docile and easily

influenced, their hearts are readily open to all high and generous emotions, their fresh intelligence appreciates the full effect of good example and loving precept, following it without either doubt or difficulty. Training and education, if well directed, produce the most admirable and satisfactory results in their regard. On the other hand, it is not to be denied that the vast majority of poor children have hitherto been grossly neglected in this respect; and, notwithstanding, we often hear surprise expressed, and most unreasonably expressed, that we should have a large number of turbulent and discontented citizens, that crime and pauperism should yearly increase, and that morality and religion would seem to be dying out of the land. In the effort to improve this posture of affairs, the State has very little power; the parent here is the ruling influence, and on him or her devolves the task. If the principles of sanitary science were only properly understood and acted on by the parents, they would then achieve a most glorious triumph in the creation of a people, who, obeying in their entirety the moral and physical laws, would become a wonder and a model to the world. If to attain an ideal such as this is beyond the scope of reasonable expectation, it is not surely too much to hope that the gradual spread of sanitary knowledge will remove many of the mistakes now made in dealing with the young; and that if we cannot realise our highest aspirations, we may yet approach them more closely than we do at present. In dealing with this subject we will not follow the example of the old philosopher, who being asked to take upon him the education of a child, declined the task on hearing he was a year old, giving as his reason, that his aid was sought a year too late. Though the value of early impressions can hardly be overstated, yet, the first year or two of child life is more a process of physical growth, and the gradual increase of instinctive intelligence. It is not until the reasoning faculties, properly so-called, are to some extent developed, which period will vary in each child, but may be taken to lie between the periods when he has become a year and a half to two

years and a half old, that the precepts here inculcated can be practically applied to any considerable extent. It is at this period that a child is first affected for good or evil—always supposing he has received proper care and nutriment—by the persons about him, and that their words and actions come to have a definite effect in the formation of his future character; from this point then, his training, both moral and physical, becomes of the highest importance. We put moral first, because, unless the child receives a proper moral training, his physical training, and in the vast majority of cases his physical health, becomes an utter impossibility. The first point to be attended to in the moral training of a child, a point of all others of the highest importance, and which, if successfully attained, renders everything else comparatively easy, is Obedience. It should be the first effort of the mother or nurse to train the child to instant, unquestioned, unreasoning obedience. There should be no paltering with this matter, no attempt to explain the grounds upon which every little act of obedience is required; the child should be made to obey first, and any necessary explanation may be, and should be, wherever admissible, given afterwards. This brings us to the consideration of an exceedingly interesting question in relation to the training of children. It is all very well to say a child must obey, but most children will not obey, when the matter is unpleasant, unless from a motive of fear, and the question arises, as fear must be employed as a motive, what kind of fear is the best, mental or physical; which nature is to be appealed to, the lower, or the higher—the body or the mind. It is here the first great error is usually committed; instead of using some mild physical punishment, or pain, the nurse appeals to the imaginative faculties, often unduly active and always irritable and excitable at that age, and threatens the child with ghost or goblin, or some sort of nursery bugbear. Now, no more injudicious course than this could be taken, or one more liable to be prejudicial to the child's present and future mental health. A short physical punishment, as a sharp

slap or two, is very much better; or, what is in many cases preferable, if the child is running about, its hands may be tied together with a piece of soft tape for a minute or so. This rarely fails in its effect, for children cannot bear their hands restrained in any way. When the child becomes older, say three, or four, or five, there is often observed another accession, so to speak, of the spirit of disobedience, and it is interesting to note that this is an age at which certain brain diseases often occur. There are two ways of dealing with this, and to deal with it satisfactorily the temperament of the child should be taken into consideration. Children mainly present two different temperaments, the sanguine and the phlegmatic. The former are very lively, cheerful, excitable and communicative; the latter are, even while cheerful and active enough, graver in habit, or what nurses call more sensible. The former are easily overcome with a slight punishment, but the latter are often very stubborn. The means taken with these latter should never be violent; if an ordinary punishment does not suffice to produce obedience, it should never be followed up. It has occurred that parents, under the idea of compelling obedience, have beaten children to a dangerous extent, locked them in garrets, deprived them of food, all which measures are usually ineffectual, no matter to what extent they may be carried, or if for a time they produce compliance, it is only in seeming, for it will be observed that the disobedience is repeated on the next occasion as persistently as if no punishment had been inflicted. In dealing with these tempers, a very different course must be adopted. In the first place, the commands given to such a child should be as far as possible negative—such as ordering it *not* to go to such a place, or to cease meddling with such a thing, so that if it disobeys, it is in the absolute power of the parent to prevent the repetition of the offence forcibly, if necessary, which is not the case if a child is commanded to *do* a certain thing, as to say he is sorry, or beg somebody's pardon, which he has it quite in his power to refuse. But in the main, he should be dealt with not by

absolute punishments, but by withholding rewards which may be given to the other children who are obedient; in fact, the system of small rewards for good conduct is not put in force as often as it should be; it is a most valuable aid in the training of children; at the same time the words of Fénélon in this respect should not be forgotten: "Never promise children dress or nice things to eat, as it is teaching them to value what they ought to despise." Books, pictures, and toys are, however, not open to this objection. Above all, it is necessary never to allow the slightest temper to be manifest during any punishment inflicted on a child. Everything in that way should be done with the utmost coolness and deliberation, and it should be sought to impress on the child's mind, that it is a most painful duty which he compels his parent to perform in obedience to a higher than any earthly authority. It is to be remarked further, that while punishments should be always short, they should be always in earnest, and they should be very seldom inflicted. The effect in youth of one deliberate punishment is often so good, that it may not be necessary to repeat it for years, if at all.

The dread of it, and the manifest unwillingness of the parent to inflict it, is usually a very sufficient deterrent. In fine, punishment should be rarely or never inflicted except for deliberate disobedience; all faults of temper, excitement, &c., should be very leniently dealt with, and in a great many instances should be judiciously overlooked. Interfering with children for every small fault is very apt to lessen their natural engaging frankness, to destroy the mutual confidence that should exist between the parent and child, and in the end to render him secretive and hypocritical. There is one fault, however, to which this exemption from punishment does not apply: personal modesty must be enforced early, and the first act of indecorum severely punished; this requires a good deal of careful watching, to discover and repress early, but the excellent results which follow will amply compensate for the trouble. Before concluding this part of the subject, we

need not impress on the parent, the necessity that exists for instilling into the little child's mind the higher motives of religion as a guide to his conduct, and holding out hopes to him of a future certain reward should he persevere in virtue. In relation to this subject we cannot do better than quote the following admirable passage from Dr. Tanner's work on the diseases of infancy and childhood: "Let it not be forgotten also, early to make attempts to foster the growth of genuine religion; not the canting religion of dreary Sundays, of assuming solemn looks, of text-quoting, or of uttering long prayers before men, but rather the religion of the head and heart; that true faith, in fact, which leads and aids a man to do his duty to his God, his neighbour, and to himself. The little child who is brought up to repeat short and simple prayers at his mother's knees, has a rule of conduct thereby instilled into him which will probably never be forgotten, and in after life he may not only look back to these beginnings with feelings of reverence and love, but the recollection of them may serve to strengthen him in some good resolution, or assist him to resist many a powerful temptation. Teach the young also to hate hypocrisy and artifice; to love sincerity and earnestness; to be straightforward and honest at any sacrifice; to despise vice and wickedness in all shapes, but especially to detest it in the educated, and above all, when practised under a cloak of religion."

The period at which a child ought to begin to learn has been the subject of much dispute, but of this there can be no doubt, that he ought to learn very, very gradually. There ought to be no systematic lessons until he is at least seven years old, and then they must be very short, and divided by intervals of recreation. If the child knows how to read, write a little, and can tell figures by sight at ten years old, he has done very well, and his future progress will be much more rapid than a child of the same age who is reckoned a prodigy of juvenile erudition. If unwise attempts be made to exercise the child's intellectual faculties sooner, his body will suffer. The reason of this is,

that at that period of life, almost all the nervous force the brain can supply is fully taken up by the physical processes of growth and development which are then going on, and if these forces are lessened or misdirected by working the brain too soon, the result will be present loss of health, and most probably an ultimate loss of intellectual power.

In considering the typical healthy life for children, the first requisite is a good nursery. This should, if possible, be a large, airy room, with plenty of sunlight; in a city it should be at the top of the house, as the air there is purer than on the lower stories, no curtains or blinds should be on the windows, and there should be good ventilation, without draught. A fire will be necessary during the winter months, but the temperature of the room need not be very high. It will be found serviceable to have the floor covered with oil-cloth. The children, however, should not be kept in the nursery all day, or even any large part of it together; frequent breaks should be contrived—in fine weather out, in wet weather to some other part of the house. They should be sent to bed as a rule early, and they should get plenty of sleep, bearing in mind the saying of John Hunter, whose receipt for rearing healthy children was—"Plenty of sleep, plenty of milk, and plenty of flannel," and in this pithy sentence he indicated very correctly the proper diet and clothing for the young. However, when three or four years old, some soup may be added to their diet, and a year older a little meat; some children, however, require meat very early, and milk does not seem to agree with them. Dr. Letheby, in his "Cantuor Lectures," thus gives the diet proper for children: "Up to six or seven months no other food but milk should be administered, for infants have not the power of digesting farinaceous or fibrinous substances, and a child may take from two to three pints of milk diluted daily. After seven months and to about twenty months, farinaceous matters may be mixed in gradually increasing quantities with the milk, but they should be well cooked, by first baking them and then thoroughly dissolving them by boiling.

After this age and up to the third year the quantity of well-cooked farinaceous matters may be still further increased, and given as puddings, with a little egg. Bread and butter may also be eaten, and towards the end of the time the child will digest well-boiled potato with a little gravy of meat. From the third to the fifth year a little meat may also be given, and at the end of the ninth year it may partake of the usual food of the family; but all along it should make use of a large proportion of milk in the various forms of bread and milk or milk puddings with eggs. About the tenth year a child will require about half as much food as a woman; in fact, the proportion of food required by the child is much greater per pound weight of the body than by adults, because it has to form its tissues and build up its several structures." The love which children display for sweets should be indulged—the natural longing pointing out its fitness for them—within reasonable bounds. White sugar is probably the most unobjectionable form of sweetmeat, and it is useful to remember that sugar is a heat-producing aliment, and that children are very susceptible of cold; the occurrence of chilblains so frequently in childhood points this out very forcibly. The taste gradually disappears in men as they grow old, but is often to be found as strong in women as in children. The explanation seems to lie in the fact that most men take some form or other of alcoholic stimulant, and that this supplies the want of sugar in the economy. Considerable support is given to this view by the fact which the writer has observed, that men in the habit of drinking habitually, to what might be called slight excess, when they become total abstainers regain in a very short time their fondness for sweets, and sometimes cannot refrain from eating the lump sugar out of the basin at tea-table, half amused and surprised at the seemingly inexplicable return to their boyish tastes.

All constrained positions, as sitting or standing long in one place, are injurious, and that most pernicious error of making children sit up straight to improve their figures

should be always avoided. The way to give them graceful figures is to encourage their natural taste for gymnastic exercises. A low swing is a good thing where there is a garden; swinging by the arms from its ropes, which children are fond of doing, develops the muscles of the chest and back, and will in the matter of producing a graceful carriage be worth a thousand backboards. The bath should be used daily, always tepid for infants, young children, and during the winter months; in summer time it may be cold for healthy children over four years of age. It should never be prolonged enough to give them a chill, and they should be rubbed dry and dressed immediately after coming out; the slower process of washing the feet, legs, arms, and face with soap and water being deferred till then. It is a serviceable practice, if the children are not very robust, to have the water made more stimulating by the addition over night of a handful or so of rock salt.

Each child wearing a jacket and drawers of flannel, their outside clothing may be chosen subject to the following conditions: First, that it is made loose, and does not press by button, belt, or strap on any part of the body. Secondly, that it be not so fine that they may not tumble on the floor or ground with it if they please; for while habits of order should be early and constantly inculcated, still they should not be restrained from the constant activity so necessary and healthful in childhood. They should, therefore, understand that their every-day suits were old, and a formal walk occasionally might be taken advantage of, to teach them how to care for their newer garments. In fine weather they should be out in the open air the whole day, while at night the tops of the windows in the sleeping-room should be always let down an inch or two. A small separate bed for each child, placed some distance from its neighbour, will render the air immediately surrounding the sleeping child purer, and is consequently more conducive to health than where two children sleep together. It should be also remarked that they should always have soft shoes

for in-door wear, which will allow the natural movements of the foot, unrestrained by any pressure, and that their walking boots should be made large and roomy. In applying these suggestions, it must be borne in mind that there should be no set system carried out with children; it is in the judicious application of general rules in part or wholly, as may suit the circumstances of each, that a successful result can be expected. Above all, it is important to win the child's affection by an invariably cheerful demeanour; petting at one time, and crossness at another, renders a child nervous and distrustful; sulkiness or moodiness, however displayed, creates in him positive dislike, but a cheerful, even temper, always patient, and always ready to grant any reasonable indulgence will win his love, and thus make his guidance easy; for after all, the old story of the wind and the sun is still true: kindness will always win more than severity, and in particular, needless severity, which should never be practised. We cannot do better in relation to this part of our subject than to quote the words of the distinguished Archbishop Whately. He says: "Most carefully should we avoid the error which some parents, not otherwise deficient in good sense, commit, of imposing gratuitous restrictions and privations, and purposely inflicting needless disappointments for the purpose of inuring children to the pains and troubles they will meet with in after life. Yes, be assured they will meet with quite enough in every position of life, including childhood, without your strewing their path with thorns of your own providing. And often enough, will you have to limit their amusements for the sake of needful study, to restrain their appetites for the sake of health, to chastise them for faults, and in various ways to inflict pain and privations for the sake of avoiding greater evils. Let this always be explained to them, whenever it is possible to do so; and endeavour in all cases to make them look on the parent as never the voluntary giver of anything but good. To any hardships which they are convinced you inflict reluctantly, and to those which occur through the dispensation of the Allwise,

they will more easily be trained to submit with a good grace than to any gratuitous sufferings devised for them by fallible man. To raise hopes on purpose to produce disappointment, to give provocation merely to exercise the temper, and, in short, to inflict pain of any kind merely as a training for patience and fortitude, this is a kind of discipline which man should not presume to attempt. If such trials prove a discipline not so much of cheerful fortitude as of resentful aversion and suspicious distrust of the parent as a capricious tyrant, you will have only yourself to thank for the result." As the time of childhood passes away, and the child merges in the growing youth, his treatment, though still based on the same principle, will naturally differ with his age. His reason must now be influenced, and his intellect gradually guided to exercise itself in pursuits more serious than those in which his childhood passed away. This process should be a gradual one from childhood upwards; in the words of Maunsell: "The progress of mental knowledge may be brought into useful operation in our work, by directing the growing faculties of the child to such portions of the general plan of nature as may be within its comprehension. Admiration for the skill of Providence may at a very early age be excited by calling attention to the more obvious adaptations of means to ends—in the forms of animals, in the benefits conferred by the mode of distribution of water over the earth, &c., &c., and a perception of beauty can be called up in a very young mind by the colours and fragrance of flowers and the influence of music." Singing has, besides the refining influence of music, a very beneficial influence on the chest and lungs; and reading aloud in the evenings is also of considerable use in improving the health and strength by exercising the muscles of the chest. Riding when possible, ball-playing, cricketing—in fact, all out-door sports, ought to be permitted to fill up at least the half of every day with boys from eight to fourteen, while the skipping-ropes and hand-ball are excellent and healthful exercise for girls. The diet should be at this age plain and substantial, and

tea as a breakfast beverage should be avoided both for boys and girls; the foundation of many dyspeptic miseries is laid at this period of life by neglecting this rule. They should be also taught to be very careful of their teeth, and it is well to have them looked at by a dentist from time to time. As they grow older, the best results accrue from the more confidential demeanour of the parent towards them; it gives them a sense of responsibility without encouraging pride and vanity, and it fosters a feeling of dignity and self-respect, which at no other time of life is needed more. In the words of Fénélon: "This confidence will charm them, for youth is sensible of incredible pleasures when we begin to confide in them, and to make them enter into some real concerns. We see a fine example of it in the reign of Queen Margaret. This princess recounts in her memoirs that the most lively pleasure she experienced in her life was to perceive that the Queen, her mother, began to converse with her when she was yet young, as if she had been a grown person. She felt herself transported with joy at being taken into the confidence of the Queen and of her brother, the Duke of Anjou, and the secrets of the State. She had known until then only the plays of children. Suffer a girl even to commit some faults in these affairs, and sacrifice a little to her instruction; make her gently remark what she should have done or said to avoid the inconveniences into which she had fallen; relate to her your past experience, and fear not to tell her of the faults similar to her own, which you made in your youth. By this you will inspire her with confidence, without which education must be a constrained formality."

The hours of sleep will also be changed, and though naturally shorter than those of childhood, they should not be less than nine hours every night. The brain still fulfils a double function, for growth is still, though not so active, yet in steady progress, and makes great demands upon the nervous force. This is probably the reason why the habit of smoking is so injurious; it might be almost said, fatal to growing boys. Its narcotic effect semi-pa-

ralyses the brain and renders it unable to supply the power requisite for carrying on properly the nutrition of the body. The consequence is, first, the digestion, then the blood suffers, the pulse becomes weak, languid, and intermittent, occasional attacks of heart-beat occur, and the boy shows a disinclination for the active out-door sports that formerly attracted him; the complexion becomes muddy, and the eyes are dull and staring; study is regarded with aversion, and there is perceptible loss of mental power. If the habit is not checked or counteracted, worse consequences ensue, and the health is either slowly undermined, or some ordinary illness supervening, proves fatal. These consequences, however, can never happen if the boy has self-control—the usual result of judicious training; his reason being convinced that the practice is wrong, will always be effectual in commanding obedience, even if there should be an interval of folly.

The most powerful means by which self-control can be strengthened and exalted, is by reading proper books. Boys are naturally delighted with exciting stories, and read them greedily. The impressions made at that age are vivid in the extreme, and it is therefore of the utmost importance that they should excite their imagination in high and ennobling directions, for as Tanner remarks: "There are numerous writings which prove as destructive to the mind of the young reader as the volume presented by the physician Douban is said to have been to the body of the Grecian King, who, as the Arabian tale relates, imbibed fresh poison as he turned over each leaf, until he fell lifeless in the presence of his courtiers. The books which are most suitable are such as, without forcing the tender intellect, lead to enquiries into the reason of things, and suggest good thoughts; such as promote determination and decision of character; such as show that all great deeds are only accomplished by incessant industry and earnest zeal; such as teach men to excel by lifting up themselves, and not by depreciating others, and such as inculcate pure principles of action, and a horror of cunning selfishness

and irreligion." All the suggestions and rules which have been laid down will prove useless unless sanctioned and supported by example. Good example exerts its beneficial influence on all, but on none so surely as the young. They are wonderfully quick to observe and imitate, and hence it is that parents who are solicitous for their children's welfare never allow them when young to keep the company of other children without a constant and watchful supervision. They are also possessed of a much more critical spirit than the generality of people suppose, and are quick to discern whether the preacher of good conduct lives up to his precept. They readily yield honour and obedience where they are convinced that this is so; but, on the other hand, they entertain sentiments of contempt and disesteem where the reverse is the case, though the outward manifestations of these feelings be for a time concealed. The boy or girl brought up at home soon comes to be influenced by the uprightness, rectitude, and industry of the father, and the patience, kindness, and punctuality of the mother; these qualities impress themselves indelibly on the children, and give them a standard to imitate, which, while it strongly excites their respect and love, keeps down pride and self-will effectually. When gaiety and cheerfulness are mingled with this strict attention to duty; when every reasonable indulgence is willingly and freely granted; when it is thus impressed more by acts than words that happiness and virtue are rarely disunited; that to fulfil the duty of each day, is a worthy object of attainment to the loftiest ambition, and that it will surely be followed sooner or later by a brilliant recompense—we may hope, nay, we may rest assured, that the future advancement of those children, whatever their station in life, need be no matter of anxiety. We will find, that when at length reason fully exerts her sway, and the perfected intellect surveys the difficult road it has passed over, the heart's truest love, reverence, and homage will be all too little for them to testify their gratitude to those faithful guides who have enabled them to avoid, or overpass the

many formidable pitfalls, dangerous precipices, and slippery paths which they now see with joy they have left behind. We cannot do better than conclude in the words of Maunsell and Evanson, when they say: "To work out in practice the principles we have attempted to lay down, we are well aware would require qualifications on the part of the parent or teacher of no ordinary kind; but the nearer we can approach to them the more likely are we to produce the *mens sana*, which we feel confident is fully as certain of producing as of inhabiting the *corpus sanum*.

LECTURE X.

EPIDEMICS.

"The sanitary reformer is not to wait for the advent of epidemical disease. It is rather when a country is free from such that he can best work in removing or mitigating all those causes which experience shows to act against the health of man."—*Stokes on State Medicine.*

SMALL-POX—fever—cholera! Words of fearful import. How many scenes of sorrow and misery, of poverty and distress, do they not recall, and yet, when they are absent, even for a short time, the remembrance of their dangers passes from the public mind, and listless apathy takes the place of a too often unreasoning panic. It is to be feared that a spreading spirit of unbelief, too common in the present day, and fostered too, in many cases, as we had before occasion to observe, by pseudo-scientific men, is one of the causes why so little trouble is taken to prevent their recurrence. We say *pseudo*-scientific men, for, true science and true faith can never be antagonistic. Even Jenner's discovery has been decried, and the efficacy of vaccination in the prevention of small-pox, though proved a thousand times, has still found doubters even during the late epidemic; with what fatal results let the death-rate of the unvaccinated show. Outbreaks of fever have been clearly proved to be caused by drinking water contaminated by sewerage, and yet it is to be feared that the pump and sewer in many small towns still remain in close proximity.

It would be a waste of space to reproduce the arguments on which these statements rest; it has been so often and so clearly done, that they who run may read; yet, in looking at one of the latest outbreaks of typhoid fever in London, it is hard to realise how so much carelessness or ignorance in regard to sanitary precautions can still exist. In the case alluded to, the children of an eminent physician were attacked with typhoid fever, and, its apparently spontaneous origin, without any centre of infection being discoverable, caused him considerable surprise, the drainage and water supply of his residence being perfect. Some short time after, it was discovered that many cases of the disease existed, and, were arising in the neighbourhood. This led to inquiry, and it was found that the disease had attacked the inmates, of at least thirty houses; they were of different positions and modes of life, but they all had one condition in common; they got their milk from the same dairy. The attention of the medical officer of health having been directed to this circumstance, he examined the dairy farm, situated some miles outside of London, from which this particular dairy got its milk supply, and after some trouble and minute inquiry, the mystery was solved. There was a well on the farm polluted by a drain which opened into it, and this drain had, no doubt, received portions of the typhoid poison, as a person labouring under the disease lived in its immediate neighbourhood. The milk vessels used to convey the milk to London were washed in this well, and thus became the means of carrying the typhoid fever to the metropolis. The well was shut up, and no new cases of the disease arose.

Typhus fever, though, without doubt contagious, yet occasionally arises in a manner which baffles every inquiry as to its centre of infection, and it very frequently terminates with the occurrence of one or two cases, when all proper sanitary precautions are taken to limit it. It is far otherwise, however, when it arises in densely crowded back streets, particularly where the inhabitants are starving or underfed. In such places it is often very destructive, and

if allowed to progress unchecked for any length of time, it seems to become entirely unmanageable, spreading to the better portions of the town, despite the most strenuous efforts to prevent it.

For small-pox we have an almost perfect prophylactic in vaccination, which should however be always followed by re-vaccination when the fifteenth year is attained, as there is much evidence that its protective powers are then in a large number of instances worn out. There is, no doubt, that after that age, a very perfect vesicle will be produced in the majority of cases. According to Dr. Grieve, the mortality from this disease during the late epidemic, was 51·12 per cent. amongst those without vaccination marks, while in those who had them, it was only 11·4 per cent; and out of 6,221 cases of small-pox treated in the Hampstead Hospital, only *three* had been re-vaccinated. The nurses, attendants, &c., who were of course constantly exposed to the contagion, were all re-vaccinated, and not one took the disease. Need a word further be said?

But though the diseases we have spoken of are very fatal, and have from time to time made serious inroads on the public health, still it remains the fact that the most dreaded, if not the most mischievous epidemic we have had of late years is Asiatic cholera, and much controversy has taken place with regard to its mode of spreading. During the early epidemics, the opinion was everywhere held that it was a disease of most highly contagious character, and all sanitary precautions were undertaken with this idea. Some time after, many distinguished authorities began to abandon this view of the case, and urged that the disease was not contagious, but spread from place to place through atmospheric causes, or during what was styled an epidemical state of the atmosphere. It is believed, however, that in adopting these views, they were to some extent influenced by the fear of causing excessive panic if the element of dangers arising from personal contagion were too violently insisted on, or too prominently pressed on the public attention. It was even

supposed by some that it might lead to a renewal of those dreadful scenes depicted with such graphic force by Hecker, as occurring during the great plagues of the middle ages, when fathers and mothers deserted their children, husbands their wives; in fact, when society for the time being, was dissolved. It was soon seen, however, that the arguments of the contagionists were too strong and too numerous to be set aside by the new hypothesis, while, at the same time, they themselves admitted that they could not make their theory account for all the observed phenomena.

A third theory, which includes them both, has now obtained many adherents, and though still to some extent on its trial, it certainly has up to the present held its ground against either of the older ones. As all precautions against epidemic spread, or importation must have some definite hypothesis to rest on, it becomes of the first importance to have a clear and settled opinion on this question. With this view, and disregarding altogether the sneers of some, perhaps well-intentioned persons, who would have us to do nothing because we may not possibly be doing the best thing, we will shortly examine the grounds on which these opinions rest, and try and form a definite conclusion. The contagionist theory, which we will take first, has had many forcible and striking examples brought forward in its support from all parts of the world. We prefer to take our example from the works of the eminent writer whom we have before frequently quoted, and who has evidently no preconceived notions or prejudices on the matter, but simply and clearly details his personal experience. Dr. Mapother thus writes:—

"At eleven o'clock a.m. on the 26th of July, 1866, one of the City of Dublin Steam Company's vessels landed from Liverpool, Jane Magee, a girl aged sixteen. During the voyage she had been very ill, which was attributed to seasickness, but she recovered so much, that after having rested at the house of her aunt, 22 City Quay, she spent some hours visiting her friends in that neighbourhood. At about three o'clock she became very ill, and Dr. Shanahan

(Count de Kavanagh) being summoned, pronounced the case to be one of cholera. She died about ten o'clock that night, and I, having received intimation through the police, examined the body, which presented every feature that cholera leaves behind. I had the windows of the rooms and lobbies opened, and some chloride of lime thrown about the premises; but all my efforts to prevent a wake were ineffectual, as they would not believe that the girl had died of cholera, and they did not wish to have the funeral until after the arrival of her mother from Liverpool. On the following morning, with the aid of the coroners, interment was insisted on, and directions were given to the family with the object of preventing the spread of the disease. Next day I went to Liverpool for the purpose of ascertaining how she received the contagion, and of observing the type of the epidemic in that city. At 3 Upper Frederick Street, near the river, this girl's mother had kept a lodging-house for sailors, chiefly those from Dutch ports. It was denied that any cholera occurred in the house, but the keeper of a warehouse about eighty yards off in the same street, had died of that disease three days before Jane Magee left, and it was very rife in the neighbourhood. At seven a.m. on the 30th, Mary Meyler, a cousin of the deceased, aged three years, who lived in the same room, was attacked; this was ninety-one hours after Jane Magee's arrival in the house. She died at nine the same night. The third case was that of the father of this child, Andrew Meyler, aged forty, a sailor of rather intemperate habits. He came from the sea on the night of the 27th to live in the same room. The circumstances of his case were sudden and melancholy in the extreme. While returning home with a coffin for his child (which he had got in Cook Street, where he imported the disease) at four o'clock in the morning of the 31st, he was seized with cramps, and in an hour after when I saw him, he was in hopeless collapse, dying in thirteen hours from the accession of the first symptom of illness. His wife, the fourth and last victim from the room, was seized at ten a.m. on the 1st of August. She could not be persuaded till the following day to go to the hos-

pital; she was then admitted into Sir Patrick Dun's Hospital, and survived till the 5th; after her removal to hospital the house was completely emptied, and all its premises disinfected, and no case occurred among the inmates, or in the immediate neighbourhood."

This is not only an excellent example of the propagation of cholera by direct contagion, but it is also most valuable in showing that proper sanitary precautions when put in force with skill and discrimination, are perfectly capable of checking the spread of the disease. We take the next example from the report of Dr. Jackson, concerning the commencement and spread of the cholera in America in the year 1832. Dr. Jackson was a non-contagionist.

"From the number of emigrants who about this period had landed at Quebec, and arrived at Montreal from England and Ireland, a first impression was created that they had been the means of transmitting the epidemic across the Atlantic. A more close investigation into the facts connected with the commencement of the disease in these cities served to destroy this supposition. It could not be traced to importation. The emigrants and lower classes of the Canadians were attacked simultaneously in both cities, Numbers of the emigrants were in circumstances eminently predisposing them to suffer attacks of the disease, and they and the lower Canadians were precisely the description of persons most obnoxious to the ravages of epidemic cholera, and such as have been universally observed to be its first victims. The lines of communication between the cities of Quebec and Montreal and the cities of the United States are by the Richlieu river, Lake Champlain, and the northern canal leading to Troy and Albany, or by the St. Lawrence to Lake Ontario, to Buffalo, and by the Erie Canal leading to Rochester and Albany. It was confidently expected that the disease would penetrate into the United States from Canada by these routes. Along the first, many cases of the disease did certainly occur in the persons of emigrants, but they terminated without its communication to others. On the contrary, the epidemic manifested a de-

cided predilection for the shores of the St. Lawrence, successively attacking the towns and villages along its banks, then following the borders of Lake Ontario until it entered Lake Erie.

"While attention was directed to the northern and western boundary supposed to be threatened by the invasion of the disease, it suddenly and most unexpectedly appeared in the city of New York. The first case occurred, it is said, on the 24th of June, when a man, a native citizen, residing at the corner of Gold and Frankfort Streets, was attacked by the disease. Four cases soon succeeded, the location of which was in Cherry Street. The subjects were Irish emigrants, who had arrived in Quebec in the autumn of 1831 and had resided in Albany until the month of May, when they removed to New York. On the 27th of June the disease manifested itself in Belvue Almshouse, distant about three miles from the city. The patient was an aged woman who had not left the house for three years, who had held no communication with the city, and no admission into the ward she occupied had taken place for a month. Several cases immediately ensued in this and the other wards of the house. The epidemic reached its maximum in this establishment on the 11th July, and terminated on the 4th August. In the city of New York the climax of the epidemic arrived on 11th July, from which period it continued very steadily to decline."

This certainly gives strong support to the non-contagious view; but the following case, which in its circumstance is different from either of the previous examples, is worthy of most serious attention. It is thus related by Pettenkofer:—

"The transport ship *Carnatic* was lying off Madras waiting to embark troops, whilst an epidemic of cholera was raging there. In the meantime, the sailors were as usual allowed their liberty days on shore, on a soil predisposed, and amidst a population succumbing, to this disease. The troops for which the transport was waiting, on coming down to Madras from an uninfected inland country, were by a well-informed commanding officer, marched right through the town with

out halting in it, and the ship put out to sea. After seven days the cholera broke out among the sailors; but though they were nursed by the soldiers, they communicated the disease to none of them, the contagious factor of cholera being present in abundance, but the peculiar soil for the production of the miasmatic condition being of course absent. In like manner the sailors in Admiral Dundas's flagship *Britannia* fell ill sixteen days after leaving Varna, with cholera of a most virulent type, and though so great mortality took place on board that they were compelled to supply themselves with additional hands from an uninfected ship which they fell in with out at sea, and to transfer some of their own sick to it in return, not the least communication of the disease to the fresh ship's crew took place."

Now how is this to be accounted for? The soldiers in the first example were freely exposed to contagion, yet they did not get cholera. The air was full of cholera products, or, in other words, there must have been an infectious epidemic state of the atmosphere, according to the non-contagionists, and yet the soldiers remained quite unaffected by the disease. There must be, then, another factor found, and Pettenkofer thus supplies it:—

He holds that for the production of cholera not only must a cholera germ, or that inconceivably minute particle of cholera poison which we call a germ, be introduced, either by the atmosphere, food, or water, into the patient's body, but that he must be also living for some period in the influence of an atmosphere rendered impure by the decay of human excreta. He says this can only occur when the earth is porous, with surface wells at no great distance beneath it. The time, then, most favourable to cholera is when hot weather succeeds rainy weather. The water which had been high near the surface during the rains, falls on the accession of the hot weather, and in sinking through the porous ground leaves behind it in the soil the organic matter, which the hot sun presently acting upon converts into the poison vapour, or, as Pettenkofer phrases it, *miasm*. He therefore maintains what might be

called the *miasm* and *germ* theory. If cholera is imported where the miasm does not exist, it cannot flourish or spread, and that this is so is proved by numerous examples; while, on the other hand, no matter how bad the atmosphere or *miasm* is, the disease cannot arise without the introduction of the *germ*. This theory has the merit of embracing the other two, while being consistent with numerous observed facts. It will be noticed in the American report that the epidemic was most severe on river banks and other low-lying places, where the condition as to sub-soil water was likely to be fulfilled. Indeed, humidity seems to bear a very close relation to epidemics, for it has been frequently noticed that they occurred mostly in wet years. Hecker adduces it as a cause of that dreadful and devastating plague the sweating sickness, and he thus describes the weather which prevailed previous to, and at its appearance: "Throughout the whole of Europe the rain fell in torrents, and inundations were frequent. Damp weather is not prejudicial to the health if it be merely temporary, but if the rain be excessive for a series of years so that the ground is completely saturated, and the mists attract baneful exhalations out of the earth, man must necessarily suffer from the noxious state of the soil and atmosphere. Under these circumstances epidemics must inevitably follow. The five preceding years had been unusually wet, 1485 proved equally so; the last hot and droughty summer was that of 1479. Extensive inundations of the Tiber, the Po, the Danube, the Rhine, and most of the other great rivers took place in 1480, and were attended with the usual consequences, the deterioration of the air, misery, and disease. The greatest inundation ever remembered in England was that of the Severn, in October, 1483. It was long afterwards called the Duke of Buckingham's great water, because it prostrated the rebellion of this powerful subject against Richard III., whom he had been instrumental in placing upon the throne, and consequently defeated also the enterprise of Henry VII. It lasted fully ten days, and the tremendous ravages occa-

sioned by the overwhelming torrent dwelt long in the memory of the people."

Dr. Mapother's cases also occurred on the banks of the river Liffey, and the sanitary state of the locality afforded, no doubt, abundant material for the *miasm*. The theory is further very strongly supported by the well-ascertained fact that cholera is a disease of the plain. Graves tells us it never ascended beyond 6,000 feet above the sea level in India, and its march was distinctly stopped by the Nepaulese and Himalaya mountains. The same facts have been observed and established in later epidemics. In London it was found that the deaths on a level with the Thames were 174 per 10,000; ten feet higher, only 99 per 10,000; twenty feet higher, 69, and 100 feet higher, 20; while when the highest point was reached, namely 350 feet, the proportion was only 6 per 10,000. Of course from this computation are excluded all cases which had received the infection directly through drinking water. It may be therefore said that Pettenkofer's theory is the only one at present which embraces more of the causes of the disease than any former one, but there still remains a class of cases which requires explanation before the hypothesis can be reckoned by any means complete. In all diseases of an infectious nature, the theory that the disease enters in by a germ, which once in the body reproduces its like in countless thousands by some process analogous to fermentation, is now widely accepted; in the words of Tyndall, "As surely as a thistle was from a thistle seed, as surely as a fig comes from the fig, the grape from the grape, the thorn from the thorn, so surely does the typhoid virus increase and multiply into typhoid fever, the scarlatina virus into scarlet fever, the small-pox virus into small-pox — the thing which we call virus is to all intents and purposes a seed;" and another modern writer thus describes the spores or germs, which are probably closely analogous to, if not identical with, those here alluded to: "Some spores of fungi are so inconceivably minute that it would require more than 200,000,000 placed side by side to cover a

square inch, yet these atoms, insignificant as they appear, keep constant to particular patterns, both in shape, size, and colour. More than this, each atom is possessed of a spark of life which, under favourable circumstances, will cause the minute spore to swell and burst and reproduce the parent plant from which it sprung. It is difficult, if not totally impossible, to conceive the infinite minuteness of these living bodies, but for comparison we may say, that one spore bears the same relation to a foot linear as a yard does to more than a hundred miles; a space four inches square is sufficient to contain a number of spores side by side equal to all the inhabitants of the world; 1,000,000 would find ample space on the head of a pin; yet the life contained in these objects is so tenacious that neither the burning sun of summer nor the severest cold of winter causes them to lose their vital power. When they have freshly fallen from the parent plant they are highly sensitive, and if they are allowed to fall upon glass and are watched under the higher powers of the microscope, a breath will show in a remarkable manner how they are influenced by warmth and moisture." A moment's reflection will be sufficient to show with what ease bodies of this size and description can be wafted through the atmosphere, or carried on clothing, until they find soils favourable to their reproduction.

Now the question arises, given the *miasm* or atmospheric impurity in cholera, and given the cholera *germ* how does it happen that out of a number of people equally exposed to both, only a certain percentage are attacked, while the rest escape? Hudson has answered this by replying, that before any person takes the disease, there must first exist in his economy what he calls a condition of receptivity. This *receptivity* has its main characteristic in debility of some sort, and the excess of fatal cases observed amongst the poor, ill-fed, and intemperate gives this view a strong confirmation. While, therefore, admitting that our ideas of the nature and mode of spread may require to be remodelled as science in its progress may

happily light on fresh discoveries, we may lay down with considerable confidence the following three conditions without which cholera cannot occur, and we can then consider the sanitary measures necessary to mitigate or neutralise them :—

First.—The ground must be damp, and soaked through with organic matter in a state of decay.

Second.—The cholera *germ* must be introduced.

Third.—The person attacked must be in a state of *receptivity*, the principal factors of which may be said to be bad air, bad food, insufficient clothing, intemperance, and mental or bodily overstrain.

The exceptions to this rule are, as far as can be ascertained by present experience, where the cholera poison is introduced, either accidentally or for the sake of experiment, into the alimentary canal, or into some part of the circulating system.

In considering the means by which epidemics of cholera may be resisted, or their violence mitigated—and the same rules, slightly modified according to the circumstances of each, apply to all other epidemics—it will be convenient and necessary to divide the community into three classes, with a view to understanding the duties which devolve on each. The first of these is the governing body; the second, the sanitary authorities, including their officers; and the third, the people. To the governing body—or Parliament—it belongs to enact the laws necessary for the health of the whole community, and to lay down clear rules for the direction of the sanitary authorities in each locality. On the clearness and completeness with which this is done a great deal of the public health depends, and we may here remark that the present sanitary laws, particularly in Ireland, are both incomplete and contradictory, nor is there much present prospect of improving them. The consequence is that the local authorities are nearly powerless, and the best directed and most energetic efforts of the medical officers of health are rendered in many cases inoperative. Indeed, considering the

manner Parliament has dealt with sanitary matters hitherto, it becomes worthy of serious consideration whether it would not be better, instead of passing further and perhaps more complicated enactments, to give—at least, during epidemics—the principal medical officers of health, power to frame general orders which, when approved by the Privy Council, would at once have the force of law. This would save much time and many valuable lives, which under the present system must inevitably be lost. Those orders could be rescinded, modified, or amended, as they were found to work, and public opinion in the present day would constitute a check sufficiently powerful to keep them within reasonable bounds.

The second class concerned in the prevention of epidemics is the local health authority, corporation, or town council, as the case may be. Their duties are of a most important and multifarious nature, but they may be briefly classified under these heads, in the order of their importance—water supply, drainage, general sanitary measures. Their first and greatest duty is to provide for the population under their care a proper supply of pure water. The importance of this cannot be overrated, particularly in epidemic cholera. If the water supply be impure in a large city, thousands of deaths will be the result, while in a lesser degree, in smaller places, the carnage will go on ; and if, through their supineness or carelessness, they allow this to occur, they labour under a dreadful responsibility.

There cannot be a more forcible example of the influence of bad water in the causation of cholera than that which was reported by the medical officers of health in London, in 1854. At that time, two water companies taking their water from different sources, supplied the same street, having of course separate mains, pipes, &c. In the houses supplied by one of the companies, the cholera deaths were 37 to every 10,000. In the houses supplied by the other company, the deaths were 130 to 10,000; this, in the same street, in houses of the same size, and under conditions in every respect similar, with the one single

exception of the water supply. It was the opinion of the medical officers, that 2,500 persons lost their lives by drinking the latter water, who would have been saved could they have procured the former. The drainage will require as a rule to be constructed under the inspection of competent engineering authority; and, even if apparently expensive, it will repay the outlay in the improved health of the population.

Their third duty is to see that the sanitary laws are enforced without fear or favour, and to carry out the recommendations of their medical officer of health, employing a proper and sufficient staff for the purpose. When this is done thoroughly, the results on the health of the population are very striking, and is well illustrated in the case of Bristol, which suffered dreadfully in the cholera epidemics which occurred in the first half of the present century. But when the corporation, keeping pace with the advancing intelligence of the age, appointed a sanitary officer, gave him full power to devise means for their protection, and placed a proper staff of police inspectors under his orders, a very remarkable change was apparent. To use his own words—"During the epidemic cholera of 1832, there died in Bristol of that disease nearly 1,000; in 1849, 1,972 died. In that year, I saw 21 dead bodies carried out of the Bristol Workhouse in one day. In the epidemic of 1854, we lost 430. In the year 1866, with the system of disinfection described elsewhere, in full operation, our total mortality from Asiatic cholera was only 29, and the majority of those cases had brought the disease with them from other parts. We were surrounded at nearly every point of the compass by places infected with cholera—Wales on the west, Exeter on the south, London on the east, and Liverpool on the north. Each sent its quota to try us on twenty-six different points, and we stood the test well." This is a result of which the sanitary authorities may well be proud, but it is still the fact, that the most important duties devolve on the third class we have enumerated—namely, the people themselves; and further, if they fail in their performance of those duties

either from ignorance, apathy, or any other cause, the efforts, no matter how strenuous or persevering of the other two, will be frustrated. An intelligent population willingly co-operating to carry out sanitary measures, will do wonders, even with a very small sanitary staff. Without their active hearty help, the largest staff will be able to accomplish little.

We may now consider what are the duties of the people in times of threatened epidemic—we say threatened, for all experience shows that that is the time to work in. Once an epidemic gains a footing amongst a population, the best devised measures are, as a rule, able to effect little good.

To those who have read the preceding lectures, we have little to say. By obeying the directions there laid down, they will obey the great physical laws, and over a people obeying the physical laws epidemics have little power. As we have before stated, it is established now with sufficient certainty, that besides the introduction of the specific poison or *germ* of epidemic disease, there are other conditions necessary to its spread amongst a community. It must find a congenial resting place. If we want to know where that is, we have only to trace the early steps of any epidemic of cholera on its arrival in a country. It appears first in some close den or over-crowded lodging-house. It spreads in poor neighbourhoods, where the people are massed together in small rooms in tenement houses, breathing bad air, living on bad food, the ground damp and soaked through with every species of abomination, the boards rotten with filth, and reeking with foul vapours (*miasm*); where the air is poisoned by exhalations from the skin, which has been unwashed, perhaps, for months, from lungs which make the bad air they breathe more poisonous still; where windows are nailed up, and even unused fire-places stuffed. It selects its earliest and most frequent victims from the debilitated—the drunken—the intemperate (*receptivity*). This is so invariably true of the latter, that during the progress of epidemic cholera, it is remarked that the largest number of cases occur on Monday morn-

ing, in consequence, no doubt, of the previous day's excess.

It has been asserted, and not without considerable historical reason, that a wide spread moral corruption existed in society previous to the advent of any of the great epidemics of former times; the great plague in England, during the reign of the Second Charles, being a comparatively modern instance. Now, without stopping to enquire whether or no that opinion rests on a sound foundation we may remark, that we cannot obey the physical law; we cannot possibly secure health and long life, without overcoming our natural inclinations. We must be temperate, regular, industrious; in a word, we must be self-denying, if we would enjoy to the full that highest of earthly happiness, good health. But man, as a rule, will not do this for mere physical reasons. The moral law, which offers him an adequate reward can alone command his obedience, and, rightly understood, the physical law is included in it. Hence he, as a rule, will obey the one best, who best obeys the other. There are, therefore, few special rules to be given beyond those already enunciated. Breathe pure air, keep the skin clean, eat well-cooked food, be temperate. If we would add to them, it would be only to say, if an epidemic should unfortunately occur, obey the directions issued by the Medical Officer of Health, and apply for medical advice promptly, if you are ill.

These directions are surely possible to all, if we except the first. There is, no doubt, a great difficulty in cities and over-crowded towns in breathing fresh air, but it is not altogether unattainable. Much good may be done by the regular, periodical soaking of the surface of the streets and yards, with a weak solution of carbolic acid. The advisability of this precaution receives much support from Pettenkofer's recently published views on ground air. He says, the earth being porous, the wind, or air in a state of motion, easily penetrates it to a considerable distance, and the atmosphere in our houses being warmer than the surrounding air, they act like chimneys, in drawing or sucking up

air which has thus gone down through the ground below the foundation level—laden perhaps, with poison — up through the basement story into the house. He states that he has known gases to travel for long distances through the ground, and even to have caused deaths in houses, far removed from their original source.

Science, while thus pointing out new dangers, in the same breath instructs us how to avoid them, and, if we are earnest in the cause of sanitary reform, the difficulties, if met by energy and resolution, are not insurmountable.

Clean the dirty floors and yards. Remove the festering manure heap, the exhalations from which are rendering the air deadly. Whitewash the walls, and get the windows made to open. This, at least, ought to be done for every house. It may be objected that no sanitary staff would be large enough to do it in crowded cities. There remains one resource. Let there be sanitary clubs instituted in every parish—in every street, if necessary. Let the respectable young men throw aside any false pride, and join together to form them. The proud French and Italian noble, nay, even the Spaniard, in the Middle Ages, was not ashamed to lay aside his rank for a few hours in the week, and, at the call of the Church, do the most humiliating offices of charity for his poorer brother, even to the extent of begging an alms for him in the public street. If the country were in danger from a foreign foe, who is there who would not esteem it honourable to serve as a private soldier in the ranks for the defence of his native land? Here is a foe more relentless than any foreign conqueror. His approaches are stealthy and rapid; his vengeance, if we are taken unprepared, most dreadful. Who can think of the horrors of a cholera epidemic, and still remain apathetic! The dreadful seizure, the agonising illness, the death, appalling in its suddenness, the haunting fear that insinuates itself into the breast of every man, and poisons his enjoyment, not to speak of its results, families in a respectable position forced, in the space of a few hours, by the death of the

father, to face the horrors of impending destitution, the desolate widows, and orphans still more desolate, the epidemic still progressing, and striking down on all sides without mercy! Some people deprecate discussion of the subject on pretence of the evil caused by creating a panic; but we say emphatically, now, in the absence of an epidemic, is the proper time for a panic. If there were a panic now, it would save numberless lives hereafter.

Why, in the name of common sense, when we have the means, can we not prepare to resist this deadly foe of civilization? It can be done. If every half-dozen streets had their sanitary society, the members of which would go from house to house, and they themselves, with brush and broom, and scraper, make clean the walls and floors, removing every speck of dirt; if they would organize in each large town such volunteer corps, who would not be ashamed to put on old clothes, or afraid of a little white-wash, who would thus join the great army of sanitary science, by carrying out those humble duties in detail by which all great victories are won. Their mission would not be less worthy of praise, in that they were banded together to save life instead of destroying it. Their banners would not be less glorious that they were crowned with the olive instead of with the laurel. This is not a struggle where the battle, after tremendous sacrifices, may still be lost. Cholera, though the most dangerous, is still, perhaps, the most preventible of diseases. By taking vigorous measures in time, by carrying them out with earnestness, thoroughly, perseveringly, we will wage no uncertain fight, for the victory will be surely ours. The following example set us by one of the cities of the great Republic of the West, may serve to inspire confidence in the most wavering and doubtful amongst us.

In 1849, the Board of Health of Baltimore asked for 5000 dollars, for the purpose of putting the city in order against invasion of cholera, as that disease had already appeared in several neighbouring cities. There was a pre-

valent opinion that this city was on the eve of an outbreak of pestilence. The mayor called a meeting of the council, and the money was promptly furnished. Baltimore was in a very filthy condition at the time, and the health officers stated that the appropriation would have been a mere drop in the bucket for cleansing the city, but the general determination of all the people was, that if cleanliness could secure immunity from pestilence, the cleanliness should be secured. The city was almost thoroughly cleansed, the exceptions being a miserable hovel about the marshes of the Patapsco River, and one closed filthy alley. The hovel was occupied by an old German woman and her son, both of whom died of cholera. A man occupied a room opposite the city hall. He died with cholera, and upon examining his room, it was found that he had been sleeping with his window opening into an alley, and that there was more filth in that alley than in all the rest of Baltimore, These cases were the sum total of cholera in Baltimore in 1849.

In epidemic seasons, when the visiting clergy and medical men have to go so frequently into infected rooms, rubbing, unavoidably, in many cases, against bedclothes or furniture saturated with organic matter, and, perhaps, with disease germs, which they may possibly be the means of spreading, the following safety dress has been recommended, and will be found to be useful. It consists chiefly of oil or smooth leather leggings, a light oil coat, and a Glengarry cap, which latter need not, as a rule, be taken off while in the sick room. If much exposed to contact, the coat may be sponged when leaving, with a little cold water, which will make all safe in a few moments; and in going into a non-infected house the garment may be slipped off, its oily surface folded inwards, and hung over the arm or bannister. By this means all risk will be removed.

Of course no one should enter a house where contagious illness exists, when fasting, or greatly out of breath.

We will conclude with the following recommendations suitable to seasons of epidemic :—

1. Be temperate, and avoid late hours.
2. Keep the skin clean and *warm*.
3. Apply for medical advice at the very first symptom of illness.

LECTURE XI.

THE INFLUENCE OF AMUSEMENTS ON THE PUBLIC HEALTH.

"Which is waste of time, work or play? Truly, sometimes one and sometimes the other, but each out of their due season and proportion. The epithet 'frivolous' (from the same root as 'fris'—what may be easily rubbed out and forgotten) is not necessarily depreciatory. Light thoughts, light occupations that are easily rubbed out and leave no care or impression behind them, are good for mind and body and worldly estate."—*Chambers's "Diseases of the Digestive Organs."*

FROM the earliest times the games and amusements of a people have possessed a great interest for the student of human life and manners. They have been sung by the poet, described by the historian and novelist, and read by succeeding generations with an ever-abiding interest. The reason is not far to seek. In moments of relaxation the real character of the individual discloses itself, and what is true of the individual is also true of nations. Their public and private amusements have often given a truer insight into their character, aspirations, and manners than the speeches of their orators, the records of their assemblies, or even their greatest political or military achievements; indeed it is not too much to say that, given the prevailing character of the public amusements, and it is possible very accurately to gauge the character and capabilities of the race. Nations whose amusements were chiefly of an athletic kind, carried on in the open air, have been generally distin-

guished by success in war and fondness for conquest; and, on the other hand, nations whose amusements were of a softer description, where music, feasting, and revelry predominated, were rather pre-eminent in the fine arts, in the nice finesse of diplomacy, and in their superior personal luxury. Nations who combined these traits were usually distinguished in commerce, and their enterprises were commonly undertaken with an ultimately profitable view.

The influence which public and private amusements exercise on the health of the community has not yet attracted that attention which it will hereafter undoubtedly receive, as soon as that influence becomes better understood. Indeed, rightly considered, there is, perhaps, no single portion of the life of a people which has such an influence on the public health as their amusements.

In considering the subject it will be convenient to divide public amusements into two great classes, Indoor and Outdoor, which we will now briefly consider in their turn with relation to their probable effect on health and life. Judging roughly of their comparative value, there can be no hesitation in at once conceding the palm to outdoor amusements. They are undoubtedly the more beneficial in every way, and their defects not only fewer in number, but much more easily remedied. Indeed, the principal task of the sanitary reformer is not here as it is in so many other cases, an effort to repress an excess, but rather to encourage a spread and development. Cricketing, hand-ball, rowing, shooting, and swimming, are all excellent amusements; to people less robust, who can afford it, riding is very beneficial. It is a mode of progression excellently calculated to afford muscular exercise without fatigue to delicate persons, and the illustrious Sydenham believed it to be a powerful preventive of pulmonary consumption. The late N. P. Willis, an American writer, thus describes some of its advantages:—

"The entire contrast of motion and occupation with the act of mounting changes at once the character and current of the thoughts. As the horse does the work and his legs

go on whether they are remembered at every step or not, it is no continual exercise of the rider's will to keep moving. With four times as great velocity, and going four times as far, the eye, during the ride, is an effortless kaleidoscope, amusing the tired brain in spite of itself. Then who that has ever ridden sufficiently to identify himself with a horse —what man that can assume at will the consciousness of a centaur—need be told of the exhilaration of feeling that his natural strength and swiftness are ten times multiplied !"

His remarks, written on the occasion of his visit to what is called in America a horse-festival, possess a great interest for the sanitarian ; and the contrast he describes is unfortunately to be seen in this country also, on every racing ground within the kingdom. He had been inspecting all the horses in turn, and he thus describes :—" One in particular, in the effervescence of completeness and youth, whose beauty for that peculiar type I had never seen equalled. His groom was leading him about by the bridle, and restrained him with difficulty in the sight of the course. He was a richly dappled chesnut or dark bay, of a glossy coat, that in its degree of silky fineness was new to me ; and only unlike the horses of the Elgin Marbles in being far beyond what the sculptor of those antiques ever dreamed of. With the profuse mane and tail of the breed he belonged to, every hair on his body seemed to express pride, strength, and fire, and with it all was an effortless and strange lightness of step, a sort of unnatural agility, which made the sward seem to be an electric battery, tossing him off as his feet touched it. He was small, but a handsomer creature of that style and weight could scarcely be imagined. In this hour of stall visiting and unblanketing we found, of course, excellent stuff for comparison and discussion. The art of removing defects and engrafting excellencies was fully discussed, 'with illustrations.' But the unaccountable wonder is (to repeat a remark I have elsewhere made), that with such an example under our own hand of what can be done to perfect one family of nature, the horse, we are not stimulated to extend the experiment

to another and more important family, that of man. I could not help looking round upon the crowd in coming out from the stalls and stables of the carefully protected quadruped, and lamenting exceedingly the undeveloped and carelessly neglected frame and health of his master, the biped. Of the hundreds on the field within sight there was scarce one who would not be pronounced by a jockey, an animal out of condition."

There could hardly be a severer comment on the neglect of sanitary science that existed thirty years ago in America than this; but it is by no means a comforting reflection that after the lapse of time and the supposititious increase of intelligence since, we are still justly liable to a similar reproach, if not to the full extent, most dangerously near it.

The volunteer system is likely to exercise a very beneficial effect on the public health by the inducement it holds out to persons otherwise of indoor occupation, who in the occasional adoption of a soldier's life get plenty of pure fresh air, and take a good deal of salutary exercise under the novel and healthful excitement it affords them. It is much to be regretted, however, that the art of swimming is not more widely cultivated than it is. All over the country there are plenty of facilities for the erection of proper bathing places on rivers which adjoin towns and villages. They are not taken advantage of to any great extent, hence the rising generation are deprived of one of the most delightful and health-giving of outdoor amusements. Now that swimming baths are projected for the metropolis, with some prospect of success, the effect of this example may direct more attention to the subject.

It is a matter for regret that all these outdoor amusements are almost exclusively enjoyed by the stronger sex, while the principal outdoor amusements of women of the better classes seem to be dawdling at a slow pace through a flower show or fashionable promenade; an amusement which instead of being healthful, is often most injurious Slow walking, or purposeless strolling tires the muscles out, without at all exciting the circulation, which is one of the

most beneficial effects of outdoor exercise. The skin under those circumstances remains quite inactive, and as the muscles have to do all the exertion themselves without the great aid of the pendulum-like motion of the lower limbs, which forms such an aid when a brisker pace is maintained, fatigue and lassitude supervene early, and amongst other evils, give a distaste for all muscular exertion. The remedy for this is the extension of the system of gymnasia for young ladies, similar to the German one already in existence in London. A little experience of the pleasure to be derived from athletic sports would soon cause them to be widely adopted. It may be therefore stated generally that standing long or walking slowly, is always more or less injurious, while brisk walking, swinging from the arms, skipping and hand-ball playing, are decidedly beneficial. Of course every young girl should be taught to swim.

Walking being, after all, the healthiest, as it is in the vast majority of cases the most attainable and convenient outdoor amusement, it is of importance to devote a little space to its consideration. When taken at proper times and in reasonable quantity, it quickens the circulation, increases the action of the lungs, by which the capacity of the chest tends to enlarge, stimulates the skin, until a healthy pleasant glow is perceived, and increases the strength and appetite. The best time for it, as a rule, is between breakfast and dinner, setting out about an hour or an hour and a half after the former meal. If robust health is enjoyed it may be taken before breakfast, but this is not a good plan for ordinary people, for the stomach being without food from the previous night, a sense of exhaustion is likely to be induced, accompanied by loss of appetite. There should also be an interval of repose after brisk walking before eating a full meal, the nervous force being at that time so distributed to the organs of locomotion, that the stomach is for the moment deprived of it. After a short rest, however, the craving appetite announces that the stomach has received its full supply, and then the meal may be safely

partaken of. It is well, if possible, to have some object in a walk, as some place to visit, or some business to transact. This prevents the walk from becoming a formal ceremony, undertaken for health's sake alone, and the slight interest at its end very much lessens the feeling of fatigue that results from purposeless strolling, even when carried to a short distance. Lively conversation and companionship are, of course, most valuable aids, and according to the old proverb, shorten the road. These advantages are not, however, possessed by every one, and the consequence is that walking, instead of a healthful amusement, becomes to some people a piece of listless drudgery. One very good plan for investing walks in the country with variety, is to try and take an interest in the common natural objects by which one is there everywhere surrounded; a slight knowledge of botany is a great resource for brightening an otherwise lonely and common-place stroll. Some acquaintance with natural history is a means easier still, by which we gain an interest in country rambles, and the commonest facts, when carefully and intelligently observed, often lead to the most interesting and instructive results. In illustration of this we may mention that there was once a naturalist, Mr. Gleditsch, who, considering the number of birds that are in the air, the trees and hedges around us, and that a great number must consequently die every day, yet could only remember to have seen a dead bird but seldom. This is, indeed, the general experience, a dead bird being a rare feature of country fields. As he often observed moles to disappear in his garden, he placed a dead mole on a particular spot of his garden bed, and on looking for it the third morning after, he found it had disappeared. He therefore dug over the spot and found it buried about three inches below the surface, and two or three beetles under its body. Wondering how it could have been interred, and wishing to satisfy himself as to the personality of the sextons, he performed the following experiments thus given by Kirby and Spence :—

"To determine these points more clearly, Mr. Gleditsch

put four of these beetles into a glass vessel, half filled with earth and properly secured, and upon the surface of the earth two frogs. In less than twelve hours one of the frogs was interred by two of the beetles, the other two ran about the whole day as if busied in measuring the dimensions of the remaining frog, which on the third day was also found buried. He then introduced a dead linnet. A pair of beetles were soon engaged upon the bird. They began their operations by pushing out the earth from under the body, so as to form a cavity for its reception, and it was curious to see the efforts which the beetles made, by dragging at the feathers of the bird from below to pull it into its grave. The male having driven the female away, continued the work alone for five hours. He lifted up the bird, changed its place, turned it, and arranged it in the grave, and from time to time came out of the hole, mounted upon it, and trod it under foot, and then retired below and pulled it down. At length, apparently wearied out with this uninterrupted labour, it came forth and leaned its head upon the earth beside the bird without the smallest motion, as if to rest itself, for a full hour, when it crept under the earth. The next day in the morning the bird was an inch and a half under ground, and the trench remained open the whole day, the corpse seeming as if laid out upon a bier, surrounded with a rampart of mould. In the evening it had sunk half an inch lower, and in another day the work was accomplished and the bird covered. Mr. Gleditsch continued to add other small dead animals, which were all sooner or later buried, and the results of his experiment were, that in fifty days four beetles had interred in the very small space of earth allotted to them four frogs, three small birds, two fishes, one mole, and two grasshoppers, besides the entrails of a fish, and two morsels of the lungs of an ox. In another experiment a single beetle buried a mole forty times its own bulk and weight in two days."

With regard to the proper distance for walking, it will depend on the strength and practice of the individual; one will walk ten miles with pleasure, another will be

seriously fatigued by five. This rule, however, may be laid down: that walking should always stop at slight fatigue; that is, that after three or four hours' rest there would be no disinclination for further exercise. Another precept to be borne in mind is, that if severe mental exercise be taken, as intense study, composition, or the like, the physical labour of walking should be indulged in very moderately, as it will not be well borne. Some persons after severe study will go out to make great physical exertions, though they would never think of sitting down to study after prolonged exercise. Another mistaken idea is also met with, by which it is supposed that the work done by the mind and body should be equal, thus—if you work mentally four hours, you should walk four hours. Nothing can be more erroneous; the same brain supplies the nervous power necessary for walking, as well as for thinking, and if you are working much mentally, you should do little physically, and the rule may be reversed with advantage. A very good example of how greatly this rule conduces to health and longevity, may be seen in the bench and bar, who, during the winter terms, can hardly get any physical exercise, six days of the week being employed in the courts from light to light, and working, no doubt, also, some hours in the night, to be ready for the morning's business; yet they, as a rule, enjoy excellent health, and many of the judges attain old age. No doubt they have long vacations, during which they reverse their mode of living, and they have a break of one day every week. Persons with any delicacy of the chest, inherited, or otherwise, should beware of long or rapid walks, except under medical advice, and walking tours, by growing youths of sedentary occupations, should not be undertaken. The nervous system often breaks down under the unaccustomed strain, and consumption sometimes results.

We now come to the amusements termed indoor, and on reviewing them it will be at once acknowledged, that sanitary science has not a more difficult task than in trying to alter and repress them, so as to remove, or at any rate

mitigate, the dreadful injury they now inflict on the public health. The principal indoor amusements we will deal with, classified in their probable order of frequency, are, parties, balls, theatrical representations, popular lectures, concerts, and miscellaneous entertainments. In estimating their influence on the public health we may safely say, that there is one objection, speaking generally, common to all, namely, that the air breathed is almost always impure, in other words, ventilation is deficient. Modern improvements are gradually overcoming this objection in some places of public entertainment, but in the vast majority it still continues, and in many private houses the evil is particularly noticeable.

The present state of the stage has, undoubtedly, a most injurious effect on the public health; by lending its aid to lower the moral tone of the people. French extravaganzas, French operettas, quite as objectionable in tendency as Wycherly's plays of the time of Charles the Second, which Macaulay scourged so unmercifully, occupy it, to the exclusion of more moral, as well as tenfold more artistic and intellectual entertainments. Meaningless, tedious, and absurd burlesques, devoid of wit, except allusion to local circumstances—the late happening of which gives an air of smartness to the reference—may be called by that name, and where broad *double-entendre* takes the place of humour, encumber the stage. They even threaten to usurp altogether the place of the excellent English comedy, and the really laughter-moving farce, with which some of the brightest ornaments of English literature have enriched our, alas! non-acting drama. Of late years, too, drinking bars for the sale of stimulants being introduced within the house, have aggravated every evil tenfold, and the nervous system unduly strung up by the combined effect of mental and physical stimuli, receives, unwittingly, dose after dose of the poison-laden atmosphere. Finally, when all the air passages, being congested by temperature and stimuli combined, are suddenly subjected to the cold, and, commonly, damp air, after leaving the theatre, it cannot be a matter of

surprise that fatal acute illness often dates from a night at the play, or that a frequent recurrence of some such miscalled amusement, should lay the seeds of chronic disease, which, after rendering life miserable, usually terminates it early. The singing houses and music halls of our great city, at one time far more objectionable than the theatres, are now, in this one respect, less open to objection, inasmuch as the theatres have sunk so near their level that a comparison is scarcely worth drawing as to which does the public health more injury. The tobacco smoke, which loads the atmosphere in these places, is very injurious to the lungs of those who frequent them. The various miscellaneous entertainments, half concert, half monologue, are, perhaps, the least objectionable of this class of places; indeed, if their ventilation and warming were properly attended to, they would be, generally speaking, quite unobjectionable.

The length of the entertainment should not exceed two hours, or two hours and a half. The Continental practice of commencing early, say at six o'clock, which is in force at many of the smaller Continental theatres, as at the Frankfort Opera House, would be of manifest benefit, as it would permit a supper to be partaken of after the fatigue of sitting so long, with a sufficient interval for digestion before retiring to rest. The hour of retiring not being so long postponed as is unavoidable under present arrangements; no lassitude would be felt in the morning, and we have no doubt that the adoption of this custom would increase the audiences, from the additional comfort they would derive thereby. Popular chorus meetings taking place in large halls, are always an excellent and healthy mode of recreation. Besides the elevating and refining influence of the music of the great masters with which the frequenters make acquaintance, the exertion of singing is very beneficial to the lungs, and through them to the system generally It may be asked now, what remedy is possible for the present state of the theatres? It is quite hopeless to change the public dramatic taste abruptly, and until a great change occurs, the theatres will continue to represent it very faith-

fully. But there is something in the power of the legislature. It might, at all events, prohibit the sale of intoxicating drink within the theatre or its precincts. This would be a decided improvement on the present system, and would, no doubt, save many lives yearly. There might be also a system of ventilation devised, which it would be obligatory on managers to adopt. That there is already some indication of an improvement in the public taste is seen by the success of several English comedies of late, and it may be further judged of when the fact is stated that, during a tour round most of the London theatres, undertaken by the author, he found the largest, and he will even add the most appreciative, audience in a theatre which was playing a sound old English comedy, and a burlesque which stood almost alone, in the week alluded to, in containing nothing objectionable in dress, acting, or language.

Before proceeding to deal with large parties and balls, we may here allude to several games of skill, which though not properly speaking public amusements, yet their practice is so universal, a word or two concerning them may not prove uninteresting. We allude to chess, backgammon, and billiards. The first is a very suitable game for those who, occupied during the day in avocations that do not task the intellectual powers, find in its intricate problems the mental change of occupation which rests their brain by changing the current of their thoughts. Backgammon is perhaps the best for those whose mental faculties are taxed heavily by their daily profession, while billiards is an excellent winter game for those whose mode of business compels them to pass all the daylight hours at a sedentary occupation. It may be remarked here, however, that the tobacco-laden, gas-heated atmosphere of most billiard rooms is a severe counterbalancing force to the advantages to be derived from the game. The new portable apparatus, by which the billiard table can be constructed out of an ordinary dining table, will meet this objection.

With regard to parties and balls, the first great objection to them is on the score of ventilation, but this, though

formerly an objection of a most formidable character, is every day likely to become less, as the principles of ventilation are being better understood, and in modern houses more thoroughly carried out. The hour at which they usually take place is another objection, and it would be very desirable if a return in this respect to the habits of three hundred years ago were possible, and our most splendid balls be over by ten or eleven o'clock. In a commercial country like this, however, where every available hour in the day is devoted to money-making, we fear this evil must remain for a considerable time, unredressed. But, after all, these evils sink into comparative insignificance when compared with others, which it is now our province to consider.

That dancing is a most healthful amusement there can be no doubt; it fulfils all the requirements of healthy exercise in a very efficient manner, and renders the limbs subtile and strong, and confers an easy and graceful carriage. Indeed if it were carried on in the open air where the lungs could have an unlimited supply of oxygen, it would be a very perfect mode of exercise. As it is, the stimulus of music, brilliant light reflected in glittering mirrors, flowers, various colours, and the busy hum of pleasant conversation, place it in the front rank of our agreeable and healthful social recreations. While admitting this, however, we must not forget or overlook some grave defects which rob it of at least half its value, and make some forms of the amusement instead of being one of the best friends, one of the deadliest enemies to public health. The forms alluded to are those dances generally called fast or round, the galop, waltz, schottische, &c. They are not always fast in the literal acceptation of the term, for the good old English and Scotch country dance, the reel, and strapthespey, now, unfortunately, considered obsolete, possessed a brisker movement. These are late foreign importations, and it may be stated positively, without reserve, that there is no greater source of permanent injury to the nervous system than these dances. Therefore, it should be the aim of

every one interested in the public health, to put them down and discourage them by every means. They had their origin in the frightfully disorganised condition of society on the Continent, in the latter end of the last century, and they unfortunately continued to survive the state of society that produced them. They have been hitherto tolerated and encouraged though totally contrary to our national manners, from various motives, fashion, complacency, and a certain unwillingness in each one to start first in opposition to them, but more than all, doubtless, from the ignorance that existed as to their baleful effect in the production of nervous diseases. Every day, however, the nervous system and its derangements are becoming better understood, and as knowledge advances, there is little doubt that this most mischievous feature in an otherwise excellent amusement will disappear.

We referred shortly before to the subject of low dresses, and it is certainly one of the most melancholy instances of the tyranny of fashion, to see young girls obliged to expose themselves to so much danger to health, and life, as is involved in submitting so large a surface of the skin to the action of draughts of cold air. It should be remembered that pulmonary phthisis, or consumption usually attacks the upper part, or apex of the lung; indeed, its attacking any other part first, must be always considered exceptional. Now, some phases of modern research, and notably the writings of a German physician, have tended to induce the belief that consumption has frequently its starting point in some inflammatory patch in the lungs, or the bronchial tubes that in all directions traverse them. Now, nothing is more common than an internal congestion from a draught playing on any spot of the external skin. That draught, striking the exposed neck, or apex of the lung, may drive the blood suddenly inward, just at the time when the bad and relaxing atmosphere has produced its worst effects, and the nervous system is depressed at the end of an exciting evening. These causes acting simultaneously, may lay the foundation of the little blood clot,

smaller than a seed pearl, in the little crystal air cell, which will, minute as it is, produce the destruction of the whole organ. There ought to be no such risks run; fashion should be set at defiance in a case like the present, and fathers and mothers should see that their daughters are exposed to no such dangers.

When evil like this does not result, there is often a liability to cold contracted, and a slight attack of bronchitis in the spring, or party season, is repeated for a year or two, and occasionally results in the production of winter cough, which, coming on year after year, renders life during the winter months, a burden, when it does not absolutely shorten it. Stripped of these objections, the public and social amusements would become what they ought to be—they would, to use the words of our text: "Leave no care, no impression behind them, and they would be undoubtedly good for mind, and body, and worldly estate.

LECTURE XII.

OVERCROWDING.

"Unfortunately, men in the present state of civilization are congregated and massed in towns more than they ought for proper sanitary regulations. Out of the same number of people, three hundred of the urban population died for every two hundred of the rural—the chances of life were so much less in the city than in the country."—*Simpson on Public Health.*

In his work on Political Economy, John Stuart Mill has written that "it is possible to imagine circumstances in which air would be a part of wealth," and further on in the same volume, he says: "The moral qualities of the labourers are fully as important to the efficiency and worth of their labour as the intellectual." Now, it is not only possible to imagine circumstances in which air would be a part of wealth, but, if we take air as meaning pure air, fresh air, it is a state of things which most undoubtedly exists at the present moment. Pure air is beyond all question a part, and a very valuable part, of the wealth of the working man; and when he is obliged, as he too frequently is, to consume a deteriorated bad air, he suffers for it in actual expenditure, as he is then obliged to live on better, and, of course, dearer food. It leads also, as we have shown in a previous lecture, to excess in stimulants, and thus his moral qualities being lowered, his labour, according to the latter sentence quoted, becomes of less value, It is, consequently, the employer's interest that his workmen should breathe fresh pure air; and, if they cannot do so, it may be said

that there is so much abstracted from his wealth, by so much as he gets worse or less valuable services than he might do if they breathed a pure atmosphere. When we consider the quarters of cities and large towns that the artizan and labourer inhabit in these countries, we will be coerced to admit, that he scarcely ever breathes a pure atmosphere. His circumstances force him to seek the cheapest accommodation, and the cheapest accommodation is unfortunately to be found in tenement houses, where a single room is usually the most he can afford to pay for. Here himself, his wife and children, must live as best they can, indeed, they are by no means the worst off who have a whole room to a single family. In times of distress, or temporary loss of work, it is not uncommon to have more than one family inhabiting a single room. Dr. Willis, in his essay on the Sanitary State of Dublin thus describes it: "In some rooms it is not an unfrequent occurrence to see above a dozen human beings crowded into a space not fifteen feet square. Within this space the food of the wretched beings, such as it is, must be prepared; within this space they must eat and drink—men, women, and children must strip, dress, and sleep. When death releases one of the inmates, the corpse must of necessity remain days within the room. Let it not be supposed that I am selecting some solitary spot for this description. No; I am speaking of an entire district, and state facts incontrovertible. I indulge in no theories as to the causes which produce this state of things, but I state the results. They are, that every cause that can contribute to generate contagion exists here in full vigour, and that disease in every aggravated form, with all its train of desolating misery, is rarely absent." This was written more than a quarter of a century ago, and yet so slow is the progress of sanitary knowledge in the public mind that there are parts, not alone of Dublin, but of many cities and towns in the empire to which that description would at this moment apply. Dr. Mapother thus graphically describes one of those dens in his excellent work on Public Health: "Gill Square is a

blind court, opening by a narrow archway under one of the houses in Cole Alley, Meath Street, in this city. Built on three of the sides of a square of about fifty feet, there are nine three-storey houses. The roofs are broken, the walls present a most unsafe and tumble-down aspect, the windows are boarded up for more than half their space. Beings whose dirty, ill-clad, and spiritless aspect it is saddening to behold, overcrowd every room to the utmost. There is but one yard for all, and in this, till last year, there was a hovel about eight feet square and ten high, in which three adults were huddled. Here, however, time has wrought improvement, for there now remains but a heap of rubbish. If I had time, or if it were my province to depict the moral features of the denizens, they would appear of even a more degraded character than the buildings." When we read this, we no longer wonder that fever is never absent from Dublin. The only wonder is, that some direful outbreak of pestilence does not occur there in some of these quarters, and overflowing into the better parts of the city, roughly awaken the well-to-do inhabitants to a sense of their duty. That this does not happen is owing, no doubt, to the labours of the sanitary authorities. But even with their most strenuous efforts, the struggle with disease, if such a state of things continues, must be a doubtful one. Even in the country parts of Ireland, what must be characterised as the most desperate ignorance of the merest principles of sanitary science prevails, and it is extraordinary to see with what one would feel inclined to term, perverse obstinacy, the great gifts of light and air excluded from the dwellings of the poor. For this the owners of property are in a great measure responsible, for, by taking advantage of the Building Acts relating to labourers' cottages, they could, without any expense to themselves, house their labourers comfortably. The cheerful cottages, well-built, and well-lighted, which some of the liberal and enlightened landlords have already built in this way, stand in striking contrast to the one-roomed cabin, with its single door, its solitary pane of glass, by way of

window, its broken floor and rotten roof of thatch, in which the vast majority of poor Irish labourers and their families are still obliged to live. It is to be hoped, also, that the recent enlightened legislation, by removing the fear of arbitrary eviction, will induce the small farmers to improve their houses, and, consequently, the health of their families. That improvement in this respect is urgently needed cannot be denied, and is well shown in the following extract from the writings of Dr. Tucker, of Sligo: "Some time ago I noticed the homely hovel of a small farmer (the tenant of a nobleman) which may be taken as a prototype of many in country districts. It was about twelve feet wide and twenty-four feet long. The domestic circle, happy family or menagerie, that dwelt therein, consisted of a sick man, his wife, four daughters, one son, three cows, one horse, two calves, two pigs, and poultry—all in one common, undivided house, no partition. Generally, the pigs dwelt beneath the beds, the people in them, and the poultry overhead. They can enjoy the prospect of bacon and chickens, which they seldom taste." The state of overcrowding here described fully accounts for the frequency with which that disease of overcrowded cities, consumption, occurs in some country parts of Ireland, where it might naturally be supposed to be unknown.

Grouping all these facts together, the conclusion is irresistible, that every day and every hour, in all parts of the country, the great physical laws are persistently violated. A state of things like this would be well calculated to discourage all sanitary efforts, but that there is fortunately in the dark prospect one bright spot, though it be as yet a small one; some gentlemen, whose philanthropy and public spirit cannot be too much commended, have succeeded in erecting some very fine tenement houses in Dublin, with all the latest sanitary improvements, and from the success which has attended their venture, and the eagerness with which rooms in them are sought after by the working classes, it may be easily learned that the latter are fully sensible of their many advantages. This will lead, no

doubt, also in time to other similar erections, which will to some extent mitigate the evil; but we are strongly of opinion that the remedy, to be effectual, must be more sweeping. If the workman is to breathe pure air he must leave the city. Some time ago this would have been impracticable. Now, however, when workmen's tram-cars have proved a success, a little energy and enterprise are all that is needed. Sites could be selected in the suburbs, well clear of the city, and squares or rows of cottages built thereon. Good four-roomed cottages can be built for from sixty to seventy or eighty pounds, with every sanitary requisite, and the rent to pay a profitable—nay, even a handsome percentage on the money invested, need not be more than, or even so much as is now paid for the wretched rooms in tenement houses. The tram-cars could bring the men to and from their work. The means by which the necessary funds could be raised need not be indicated here. They are various as they are easy, and well known to the mercantile community; but there is one point which must not be forgotten. A short Act would be required to authorise the pulling down of the worst of the tenement houses as soon as the cottage accommodation had been provided. This could be done in the centres of the overcrowded districts, and, besides removing the worst and most dangerous of these dens, it would let in light and air to those that remain standing, which would be thus rendered habitable. Great care should be exercised in the construction of new streets, so as to allow them to have plenty of light and air, and in this respect the words of a distinguished engineer (Dempsey) are well worth remembering, and his practical advice will be found of the utmost value. He says: "Courts and narrow passages, such as abound in most towns—relics of public ignorance and private cupidity, destined to be destroyed in the progress of enlightened sanitary reformation — limited in width and bounded by elevated buildings, never receive their due share of light, air, or water, and thus present the greatest combination of difficulties to the vital processes of

drainage and cleansing; and these purposes can never be economically and efficiently fulfilled until a minimum of width and a maximum of height of buildings are recognised as the elements of street proportion. The recorded and repeated evidence on this point is more than enough to establish the general principle, although the precision of the details requires observations of a more exact nature than have yet been made. It is certain, however, that no street should be less in width than the height of the buildings on either side of it; that is, that the angle formed by the transverse surface of the street, with a line from its extremity on one side to the summit of the buildings on the other should never exceed 45°. And in proportion as this angle can be reduced, will be the facility afforded for the desirable operation of the air and of such rain as may fall."

But, it may be asked, is Ireland the only part of the kingdom that suffers from evils such as those detailed above? Most unfortunately it is not. Similar pictures might be drawn from parts of every large town in these kingdoms, and it is in vain to look for more benefit than mere mitigation from sanitary precautions until some united and powerful effort is made to let the crowd divide a little, and let in the air in these dense centres of population. In London the mortality from chest disease—that is consumption, phthisical bronchitis, and analogous affections—is very large, and there is no manner of doubt that it increases in exact proportion to the overcrowding existing in any locality. To take the former disease by itself, for instance, where there are 180 square yards to each inhabitant, the deaths from consumption amount to 375 annually in 100,000 of the population. Where the space is reduced to 119 yards the deaths mount up to 405; and where the excessive overcrowding renders only 35 square yards available for each person, the mortality reaches the serious figure of 485, and the other chest diseases increase in fatality in proportion. These figures not only indicate the existence of much suffering and evil of a perfectly pre-

ventible kind, but they also represent a large amount of pauperism accruing each year from—first, the loss of the sick person's labour to his own support; second, the drain on his family caused by his illness; and third, the expense of his interment, which, if he be a father of a family—as in a certain number of cases is the case—is followed by the admission of his children into the union, to become a burden on the rate-payers. It would be no doubt cheaper to buy ground and build large suburban squares of workmen's cottages than to go on paying under the present system enormous sums in poor-rates, while at the same time the charity thus bestowed rather injures than improves both the recipient and the giver. The latter gives unwillingly and the other receives the dole with grumbling and unthankfulness, and besides producing in him loss of self-respect, it opens the door to an extensive amount of jobbery. But the mortality of London, it has been advanced, is on the whole low, and it is improbable that it could be much further reduced by any such general measure as that alluded to. The answer is simple: The mortality of London, like that of many other great towns, appears low, but the mortality of those parts of London where over-crowding exists is dreadfully and shamefully high. The mistake of estimating the life-waste from the general mortality is a too common example of the way statistical returns can be rendered useless by wilfully or accidentally erroneous reading. The mortality, for instance, in Bedford Square, according to Dr. Buchanan's report, is 12 per 1,000, while the mortality in Short's Gardens, St. Giles's, is 34 per 1,000; this is a difference that must at once strike the most unobservant. Again, if we turn to Drs. Parkes and Saunderson's Report of the Health of Liverpool, we may see the same fact still more forcibly illustrated. They found the mortality in Rodney Street—a street of the first class—to be 10 per 1,000, while the mortality in Sawney Pope—a street of the lowest class—was 55 per 1,000. Here is a waste of life which calls for some energetic effort to check it; the mortality,

too, amongst children under five years old is appalling; but it is satisfactory to observe that it is at last attracting the attention of distinguished political economists, who speak of it in a manner proportionate to its importance, and Dr. Wilson thus quotes Professor Fawcett on the subject: "It will be therefore well distinctly to appreciate what is implied in bringing into operation causes which will produce greater mortality; some definite idea may be formed on the subject by considering the results involved in the present high death rate prevailing amongst the children of the poor. Assume that there are 1,000 of these children—that 500 of them die before the age of five, whereas if they were as well cared for as the children of more wealthy parents, only 200 of them would die before this age. The death, therefore, of 300 is to be traced to defect in our social and economic condition. These children are literally slaughtered, and in a manner, moreover, which indicates prolonged suffering. But this is only a part, and perhaps the smallest part of the mischief that is done; the causes which produce this excessive mortality do not alone affect the children who die; all those who survive are also brought under the same blighting influence. Consequently to all the struggle for existence becomes more severe; the more weakly succumb; even the stronger who survive in passing through the trying ordeal often contract the germs of future disease, their constitutions being in too many cases undermined. Physical deterioration ensues, and a whole people may thus become gradually stunted and enfeebled."

We will take one further example from Glasgow, in which, while the evil is well illustrated, we may also see the manifest improvement that followed the diminution of the overcrowding. The case is thus related by Mapother, on the authority of Dr. Gairdner, the Medical Officer of Health: "The house No. 83 Drygate Street, aptly termed 'The Rookery,' consisted of forty-eight separate tenements, with an average of four persons to each room, each individual having 126 cubic feet of space, or one-fourth of the minimum space allowed for each soldier, according to

the Barracks Commission. In this building 39 cases of typhus had arisen during the year ending June 30th, 1863. Under the Police Act the tenements were thinned, and although fever in the city had doubled, and was prevalent in the very street, but one case occurred in 'The Rookery' during the succeeding year." This shows what can be effected when proper sanitary measures are taken, and no doubt immense benefits have also accrued in London from the Peabody and other model lodging-houses, as well as from the sanitary regulations enforced by the admirable staff of health officers which it possesses. Though overcrowding is so prevalent in our large towns and cities, the evil is by no means confined to this country, and it is interesting to read the report of the Central Board of Health of Belgium, where tenement houses are thus alluded to: "In these wretched habitations everything is sacrificed to the rapacity of the proprietor. Every repair which affects the health or comfort of the tenant merely, and that is not necessary to prevent the total ruin of the dwelling, is entirely neglected. What is the use of cleaning the walls for the people whose habits are filthy? Why make windows for the entrance of air and light, or repair a sewer, or cleanse an alley covered with stagnant water, for people who are accustomed to pestilential smells? It is what a proprietor can never understand. Do not believe, however, that these dreadful abodes are rented at their proper value. On the contrary, the unfortunate people obliged to live in these houses, because all better ones are closed against them, in reality pay a higher rent than for a wholesome room in a good house." These house speculators are one of the great causes of the continuance of this state of things; they obstruct in every possible way the progress of sanitary reform, and they are often connected with local authorities, whose interest they can secure, and whose influence often proves too powerful for the sanitary officers. Another difficulty is also continually present under the system as it now exists, and that is the ruinous competition of the very poor for these dens. Space is so limited, they must sleep

there or in the streets. It is not to be wondered at that such a state of things should exist in parts of most old European cities; but it is indeed a saddening spectacle to see the same state—nay, if anything, a worse state—of things existing in American cities, where land is cheap and abundant. The Western Republic will surely not long allow so great a stain on the social economy of a nation who, in all the useful arts and sciences has inscribed on her banner in brilliant letters the word "Progress." It would appear, according to the report of the New York Council of Hygiene, that in some quarters of the city, where overcrowding exists and tenement houses abound, that in 15,000 houses nearly half a million of persons contrived to exist, which would give in round numbers the enormously high average of 33 persons to each house.

If we look at it in another way, so as to form some approximate idea of the grossness of the evil, one of the wards of the City of New York, where the population was so dense, that it was calculated they existed there in the proportion of 265,000 people to the square mile. As might be expected, the mortality kept pace with the over-crowding, and in one tenement house, where 504 persons resided, there occurred, besides frequent fatal cases of fever, sixteen deaths from scarlatina, and six from small-pox within the year. The horror of the picture may be completed by adding the statement of the inspectors, who reported that on the occasion of their visit, they found 127 of the inmates labouring under illness in some form, and it was in this very house that the cholera epidemic of 1854 began. This is just the state of things of which we have so many examples at home; but if it is a matter for regret that they should exist, it is encouraging to find that distinguished American physicians have spoken in no uncertain tones on this subject; and we shall see presently how closely in accord the health authorities are in both countries, as to the causes and consequences of such a state of affairs, and their forcible reasoning and cogent language show the close con-

nection that physical and moral evil bear to one another. We have hitherto chiefly dealt with the physical aspects of over-crowding, but looking at it now as it exists on both sides of the Atlantic, its frightful moral features must not be lost sight of, and if closely studied and reflected on, they are capable of teaching a very useful lesson. Dr. James, of the Council of Hygiene of New York, thus alludes to this matter: "The passage of a Building Act prohibiting the present system of crowding, and building houses on plans so injurious to health, the occupation of cellars for dwellings, and subjecting to certain restrictions the construction of courts and rear houses. For what calls most imperatively for reform, is the present construction of tenant-houses as regards light, ventilation, and every necessary comfort. Not only does the present system of over-crowding these pent-up and unventilated apartments, and the consequent necessity of inhaling an atmosphere loaded with carbonic acid gas, and the poisonous exhalations of human bodies enervate the physical powers and predispose to diseases of the worst type, but its demoralising effects are fearful to contemplate; and instead of being the most attractive, home is often rendered the most uncomfortable and uninviting spot on earth. Hence it is that the husband spends his evenings at the neighbouring dram-shop, or gambling-house, in search of comforts which his own fireside denies him. Hence it is that children reared amid these scenes of poverty, intemperance, and the whole train of their attendant evils, becoming daily more familiar with profanity and every species of wickedness, grow up willing and early victims to whatever vicious or criminal course may seem to them more attractive than their own miserable abodes. And hence, I believe, much of the vice, immorality, and crime of our city to be due to the construction, over-crowding and mis-management of our tenant-houses. This is dreadful to contemplate, but surely, in view of the preceding figures, neither overstrained nor exaggerated. The picture is the same in England as in America, and if we had access to the returns of inspectors of lodging or tene-

ment-houses in every—or at least, the vast majority of European cities, the probability is we would meet no material change in the description. This would not surprise us in nations deprived of political freedom, where journalism is to a certain extent fettered in its free utterances, where the right of public meeting is denied; but in a country enjoying the blessings of a free constitution, with her destiny, so to speak, in her own hands, does it not seem in a large measure inexcusable? Here is the way a writer, Mr. Simon, who is perhaps the most eminent English authority on sanitary matters, speaks of it as affecting his own countrymen: "In its higher degrees, 'overcrowding' almost necessarily involves such negation of all delicacy, such unclean confusion of bodies and bodily functions, as is rather bestial than human. To be subject to these influences is a degradation which must become deeper and deeper for those on whom it continues to work. To children who are born under its curse, it must often be a very baptism into infamy, and beyond all measure, hopeless is the wish that persons thus circumstanced, should ever in other respects aspire to that atmosphere of civilisation which has its essence in physical and moral cleanliness, and enhances the self-respect which it betokens. And as a particular class of cases, in which both evils are combined to one monstrous form of nuisance, I ought expressly to mention certain of the so-called tenement-houses of the poor." It is of some interest to remark here, that as far as physical features are concerned, this description applies equally to the classes alluded to in all parts of the kingdom; while in Ireland, poverty seems perhaps still more abject than in either of the sister countries. But it is impossible to deny, that from some cause or other, with all these evil influences in full work amongst them, they have not sunk to the same depth of moral degradation. In seeking for an explanation, only one presents itself. Religion has ever formed a part of the Irish nature, no matter how poor, or rough, or lowly; and religion shining in the pure eyes of the Irish mother, or coming with gentle force in loving

words from her earnest heart, has saved her children from the lower depths of degradation into which others have fallen.

This affords a striking example of the close relations which exist between the moral and physical law. Circumstances had rendered obedience to the physical law an impossibility, but obedience to the higher moral law sufficed to save them the physical degradation which must have otherwise ensued. But though they have escaped till now the worst consequences of this state of affairs, every day it continues increases the danger.

The state of the poor children condemned to live in such places is pitiable. The father at work, the mother often absent, they are left to mix with other children, without supervision or protection. Here is often laid the foundation of ruin in after life. They soon become disobedient, then delicacy of body renders their temper irritable, the oppression of their older companions soon spoils every generous and affectionate instinct of childhood. From such a youth what manhood is to be expected? The father returns from a weary day's work to a stuffy room, a slatternly wife, a dirty, ragged lot of noisy children. It must be so; there is no room for appliances of cleanliness or decency. No wonder that the gorgeous gin palaces, which the proprietors take care shall have a lofty ceiling and a proper ventilation, hold out unfortunately too often irresistible attractions. This is a question which underlies many other questions, social and political, of apparently greater magnitude. If the health of the working man is kept low, if comfort is denied him, if the possibility of decency is not his, then shall he be an easy prey to the flattering demagogue or the crafty Communist. He cannot be more wretched than he is, and it is in the nature of things that he will in those circumstances be ready to do that from which, if he was better off, his better nature and his better sense would alike revolt.

How long is this to continue? How long must these poor people be slowly poisoned by bad air? How long

must these little children pine in close unwholesome alleys, their faces blanched for want of sunlight, artificially denied them by that greed that crowds house on house in every spot of ground within our cities? But worse than this—incomparably worse—is the blighting moral influence of the streets, deadly to their young hearts' virtuous impulses.

Theirs is a case which ought surely to command the sympathy of every man who loves religion, morality, or science, who wishes to see the rising generation of our citizens physically perfect—who wishes they should continue to cherish the noblest characteristics of a nation, a clinging love for Faith and Fatherland. The feeble language of these papers is unfit to plead their cause; we will therefare close this series of Short Lectures with the words of a great master of modern English literature, whose heart ever beat in sympathy with the wrongs and sufferings of the poor, and whose undying words will always remain a testimony stronger than sculptured marble or monumental brass to his zeal for the cause of human progress:—

"If ever household affections and loves are graceful things they are graceful in the poor. The ties that bind the wealthy and the proud to home may be forged on earth, but those which link the poor man to his humble hearth are of truer metal, and bear the stamp of Heaven. The man of high descent may love the halls and lands of his inheritance as a part of himself; as trophies of his birth and power; his associations with them are associations of pride and wealth and triumph: the poor man's attachment to the tenements he holds, which strangers have held before, and may to-morrow occupy again, has a worthier root, struck deep into a purer soil. His household gods are of flesh and blood, with no alloy of silver, gold, or precious stone; he has no property but in the affections of his own heart; and when they endear bare floors and walls, despite of rags and toil and scanty fare, that man has his love of home from God, and his rude hut becomes a solemn place. Oh! if those who rule the destinies of nations would but remember this—if they would but think how hard it is for

the very poor to have engendered in their hearts that love of home from which all domestic virtues spring, when they live in dense and squalid masses where social decency is lost, or rather never found—if they would but turn aside from the wide thoroughfares and great houses, and strive to improve the wretched dwellings in by-ways where only poverty may walk—how many low roofs would point more truly to the sky than the loftiest steeple that now rears proudly up from the midst of guilt and crime, and horrible disease, to mock them by its contrast. In hollow voices from workhouse, hospital, and jail, this truth is preached from day to day, and has been proclaimed for years. It is no light matter—no outcry from the working vulgar—no mere question of the people's health and comfort that may be whistled down on Wednesday nights. In love of home the love of country has its rise; and who are the truer patriots or the better in time of need?—those who venerate the land, owning its wood and stream and earth, and all that they produce? or those who love their country, boasting not a foot of ground in all its wide domain?

Printed by BAILLIERE, TINDALL, & COX, King William Street, Strand, London.

20, *King William Street, Strand,*

January, 1874.

PUBLICATIONS

BY

BAILLIÈRE, TINDALL, & COX.

Lessons in Hygiène and Surgery, from the Franco-Prussian War. Forming the most complete text-book of Hygiène and Military Surgery of modern times.

By Surgeon-General C. A. GORDON, M.D., C.B., late on Special Service, on behalf of Her Majesty's Government, with the Army in Paris. Illustrated, 10*s.* 6*d.*

"The work is an exceedingly valuable one as a record of personal observation, and of experiences so recently acquired in varied and extended fields of observation, by a medical officer of distinguished position and high professional attainments."—*Army and Navy Gazette.*

"Dr. Gordon's work has already attained a high character in medico-military literature."—*Boston Medical and Surgical Journal.*

"Toutes les questions se rapportant à la chirurgie sont exposées de main de maître, dans le livre de M. Gordon; il discute avec autorité les différent modes de traitement, et en particulier les principes sur lesquels doit reposer la chirurgerie conservatrice."—*La France.*

Ashantee and the Ashantees.

By the same Author, 2*s.* 6*d.*,

Life on the Gold Coast. Being a Full and Accurate Description of the Inhabitants, their Modes and Habits of Life; interspersed with amusing Anecdotes, Hints to Travellers and others in Western Africa, from the note-book of an officer long resident on the Gold Coast.

By the same Author, super cloth, 2s. 6d.; or, popular edition, paper wrapper, 1s.,

A Manual of Sanitation; or, First Help in Sickness and when Wounded. Specially adapted as a pocket companion for officers and privates of the regular and volunteer services at home and abroad, in peace and in war.

"Instructions conveyed in clear and intelligible terms."—*The Standard.*

"The official distribution of Dr. Gordon's little manual throughout the forces, would, indeed, be a boon. Volunteers would also do well to purchase and study it."—*The Medical Press and Circular.*

"Contains a great deal of useful matter simply arranged in alphabetical order for ready reference, and might be of great use to others besides soldiers."—*The Builder.*

"Though meant in the first place for army use, it might with advantage find a place in the household, as it is sensible and practical."—*The Graphic.*

Also by the same Author, 3s. 6d.,

Experiences of an Army Surgeon in India. A Concise Account of the Treatment of the Wounds, Injuries, and Diseases incidental to a Residence in that Country.

Also by the same Author, 1s.,

The French and British Soldier. A Lecture on Some Points of Comparison, delivered before H.R.H. Prince Arthur and the Garrison of Dover.

"Clearly and ably written, and may be read by civilians with much pleasure and profit."—*The Figaro.*

In the Press, Demy Octavo,

Short Lectures on Sanitary Subjects.
By Richard J. Halton, L.K.Q.C.P., L.R.C.P. Edin., L.R.C.S.I., &c., Medical Officer of Health to Kells.

Lecture I. The Necessity of Sanitary Science.
" II. Air.
" III. Sanitary Science in the Sick Room.
" IV. Ventilation.
" V. The Relation of Popular Literature to the Public Health.
" VI. Food.
" VII. Clothing.
" VIII. Cleanliness.
" IX. Sanitary Science in Relation to the Training and Education of the Young.
" X. Epidemics.
" XI. The Influence of Amusements on the Public Health.
" XII. Over-crowding.

Food; its Varieties, Chemical Composition, Nutritive Value, Comparative Digestibility, Physical Functions and Uses, Preparation, Culinary Treatment, Preservation, Adulterations, &c.

By HENRY LETHEBY, M.B., M.A., Ph.D., &c., Professor of Chemistry at London Hospital, Food Analyst and Medical Officer of Health to the City of London. New edition, entirely re-written, enlarged, and brought up to the present time. 5*s.*

"An excellent notion of the chemistry and physiological action of the various foods will be derived from a perusal of Dr. Letheby's book, and the reader will be entertained throughout by the narration of many facts which will enliven the study."—*The Lancet.*

"We know by experience that Dr. Letheby's book is readable, being garnished with gossip of all sorts, learned and unlearned; and abounding in interesting and amusing facts."—*The Scotsman.*

"Either as a text-book for schools or as a household guide, it is excellently adapted."—*Public Opinion.*

"Clergymen who are interested in 'cooking for the poor' will find much to aid them in this valuable work, a copy of which ought to be in every household."—*Figaro.*

A Handy Book of Food and Diet in Health and Disease. By Professor CAMERON, M.D., Ph.D., Analyst to the City of Dublin, &c. Cloth, 1*s.*

"The object of the book is to explain the newest views as to the physiology of digestion, and the comparative values of food substance. It is short and sensible."—*The Globe.*

"A useful statement of our present knowledge of the sanitary value of various articles of food."—*The Standard.*

By the same Author, 6*d.*,

On Disease Prevention. A Practical Treatise on Disinfection.

"This little work, which is offered at the trifling charge of sixpence, contains practical directions for disinfecting rooms, clothing, bedding, &c., with chapters on vaccination, water impurities, and other important sanitary matters."—*The Review.*

Also by the same Author, 2*s.* 6*d.*,

Lectures on the Preservation of Health.

On Vitiated Air. A Paper read before the Association of Medical Officers of Health, 1873.

By C. MEYMOTT TIDY, M.B., Lecturer on Chemistry and Professor of Medical Jurisprudence at the London Hospital. 6*d.*

Skin Diseases: an Inquiry into their Parasitic Origin, Connection with Eye Affections, and a Fungoid Theory of Cholera.

By JABEZ HOGG,
Surgeon to the Royal Westminster Ophthalmic Hospital, President of the Medical Microscopical Society, &c. *2s. 6d.*

"It gives actual experiments, which are of great interest."—*The Medical Press and Circular.*

"We have much pleasure in recommending this little book."—*The Doctor.*

"This little work must prove very useful."—*The Indian Mail.*

"Mr. Hogg gives interesting accounts of his investigations and experiments connected with the various fungi which accompany diseases of the skin."—*The Morning Post.*

"Sound teaching will be found in Mr. Hogg's treatise."—*Illustrated London News.*

By the same Author, in Preparation,

The Ophthalmoscope: a Treatise on its Use in Diseases of the Eye. 4th edition, *10s. 6d.*

The Treatment of Chronic Skin Diseases.

By E. D. MAPOTHER, M.D.,
Professor of Physiology in the Royal College of Surgeons of Ireland. *2s. 6d.*

Skin Eruptions: their Real Nature and Rational Treatment, By Dr. BARR MEADOWS, Physician to the National Institution for Diseases of the Skin, &c. Sixth edition, cloth. *2s. 6d.*

On the Tonic Treatment of Gout. With Cases.

By JAMES C. DICKINSON, M.R.C.S.,
late of the Medical Staff of H.M.'s Bengal Army, and formerly Staff Surgeon Crimean Army. Second edition. *3s. 6d.*

"We feel perfectly justified in introducing this very practical treatise on gout."—*The Medical Press and Circular.*

"A thoughtful and practical work."—*Public Opinion.*

By the same Author, 2s.,

Suppressed Gout: its Dangers and Treatment; with an Appendix on the Uses of the Vals Waters.

Also, 1s.,

Indian Boils: their Varieties and Treatment without Disfigurement.

The Training of the Mind for the Study of Medicine. A Lecture delivered at St. George's Hospital, Oct. 1st, 1873,

By ROBERT BRUDENELL CARTER, F.R.C.S.,

Professor of Ophthalmic Surgery in the Hospital. 1*s.*

"A remarkable address."—*The Lancet.*

"No one can read it without learning and profiting much."—*The Student's Journal.*

Lessons in Laryngoscopy: including Rhinoscopy and the Diagnosis and Treatment of Diseases of the Throat. Forming a Complete Manual on the Use of the Laryngoscope in Diseases of the Throat, Chest, and Lungs. Illustrated with Hand-coloured Plates and Wood-cuts, for the use of Practitioners and Students.

By PROSSER JAMES, M.D., M.R.C.P.,

Lecturer on Materia Medica and Therapeutics at the London Hospital, Physician to the Royal Hospital for Diseases of the Throat, &c. 5*s.* 6*d.*

By the same Author, 1*s.*,

The Progress of Medicine. A Lecture delivered at the London Hospital, October 1st, 1873.

"The book closes with many thoughts and precepts that seem true to us, and we think that the lecture has wisely been printed."—*Guy's Hospital Gazette.*

"An excellent resumé of the great and rapid advances that have been made in the science of medicine during the last twenty-five years."—*The Student's Journal.*

Overwork and Premature Mental Decay: its Treatment. An Essay, with Cases read before the Medical Society of London, 1873.

By C. H. F. ROUTH, M.D., M.R.C.P. London,

Senior Physician to the Samaritan Hospital for Women and Children, Consulting Physician for Diseases of Women to the North London Hospital. Price 1*s.*

By the same Author, price 3*s.* 6*d.*,

On Fibrous Tumours of the Womb: Points connected with their Pathology, Diagnosis, and Treatment. Being the Lettsomian Lectures delivered before the Medical Society of London.

Also, by the same Author, price 1*s.*,

Lectures on Diseases of Women and Children.

Also, price 1*s.*,

On Uterine Deviations.

The Text-Book of (113) Anatomical Plates, designed under the direction of Professor MASSE, with Descriptive Text.
By E. BELLAMY, F.R.C.S.,
Senior Assistant Surgeon to Charing Cross Hospital.
Second edition, plain, 21*s.*; hand-coloured, 42*s.*

"This beautiful text-book affords the easiest way of getting up the most difficult subject of the medical curriculum."—*Medical Press and Circular.*

"With these plates the student will be able to read up his anatomy almost as readily as with a recent dissection before him."—*Students' Journal.*

The Students' Case Book: containing Practical Instructions, and all the Necessary Information for Clinical Work and Case-taking. Originally compiled by a Student for Students, in order to Facilitate Clinical Work, and to encourage a Systematic Method of Case-taking. The work also contains a number of Blank Ruled Sheets for recording full particulars of Cases as seen. It will, moreover, be of great Assistance to the Visiting Physician and Surgeon. 1*s.*

Elements of the General and Minute Anatomy of Man and the Mammalia. From Original Researches.
By Professor GERBER, University of Bern, and
Professor GEORGE GULLIVER, F.R.S.
2 vols., containing thirty-four plates. 15*s.*

The Pathological Anatomy of the Human Body. Translated from the German of Professor VOGEL
By GEORGE E. DAY, M.A. Cantab., M.R.C.P. London.
With 100 plain and coloured engravings. 18*s.*

Anatomy of the External Forms of Man: designed for the Use of Artists, Sculptors, &c.
By Dr. J. FAU.
Edited, with Additions, by R. KNOX, M.D., F.R.C.S.E.
Twenty-nine Drawings from Nature. Folio. Plain, 24*s.*; hand-coloured, 42*s.*

Muscular Anatomy of the Horse.
By J. I. LUPTON, M.R.C.V.S. 3*s.* 6*d.*

An Epitome of Surgery.
By J. BEADNELL GILL, M.D., M.R.C.S.,
Surgeon to the Dover Hospital. Price 1*s.*

Deafness: its Causes and Treatment, with Anatomy and Physiology, Human and Comparative, of the Organ of Hearing; the Diseases incidental to its Structure, and their Treatment.
By JOHN P. PENNEFATHER, M.K.Q.C.P., L.R.C.S., &c., Surgeon to the Royal Dispensary for Diseases of the Ear, &c. Illustrated, 5*s.*

Diagnostics of Aural Disease. Second Edition, with a Chapter on the Application of Electricity, and Description of the Author's Magneto-Electric Catheter.
By S. E. SMITH, M.R.C.S. England. Illustrated, 2*s.* 6*d.*

The Philosophy of Voice. An Essay upon the Physiological and Physical Action of the Breath and Vocal Cords in the Production of Articulate Speech, conjoined with Vocal Utterance. By CHARLES LUNN. 1*s.*

Experimental Researches on the Causes and Nature of Hay Fever. With Wood-cuts and Lithographic Tables.
By CHARLES H. BLACKLEY, M.R.C.S. 7*s.*

"It is a piece of real honest work, original and instructive, and will well repay perusal."—*The Lancet.*

"We have read Mr. Blackley's very instructive treatise with much interest, and have been much impressed by his ingenuity in devising experiments, his industry in carrying them out, and his obvious candour in giving the results of his observations."—Dr. George Johnson in the *London Medical Record.*

African, West Indian, and other Fevers and Diseases.
By ALEXANDER LANE, M.D., Surgeon Royal Navy. 6*d.*

Diarrhœa and Cholera: their Successful Treatment.
By JOHN CHAPMAN, M.D., M.R.C.P. London. 1*s.*

"His arguments are enforced at great length in the pamphlet before us, and are supported by an extensive array of facts."—*Medical Times and Gazette.*

Causes of Cholera: its Treatment.
By WM. GROVE GRADY, M.D., M.R.C.S. 1*s.*

Typhoid Fever: its Treatment.
By WILLIAM BAYES, M.D., L.R.C.P. 1*s.*

How to Prevent Small-pox.
By MORDEY DOUGLAS, M.R.C.S., L.R.C.P. Third edition. 6*d.*

"This is a very valuable pamphlet."—*Medical Press.*

The Specific Action of Drugs. An Index to their Therapeutic Value. Price 10*s.* 6*d.*

By ALEXANDER G. BURNESS, and F. MAVOR, President of the Central London Veterinary Society.

The object of this work is threefold:—

1. To point out that each drug when introduced into the system acts upon some *special* parts or tracts, in virtue of its physical, chemical, or dynamical properties.

2. That the therapeutic value of each drug is to be determined by ascertaining the symptoms produced, and the parts influenced by it when introduced into the healthy animal system.

3. That while a toxic dose will effect such changes in a part as to unfit it for any vital action, a lesser dose, applied to a diseased part, will, by removing that state of combination of the elements which excited diseased action, enable the normal process of nutrition to restore the healthy constitution.

The Sewage Question: a Series of Reports. Being Investigations into the condition of the Principal Sewage Farms and Sewage Works of the Kingdom, from Dr. LETHEBY'S Notes and Chemical Analyses. 4*s.* 6*d.*

"These Reports will dissipate obscurity, and, by placing the subject in a proper light, will enable local authorities, and others interested in the matter, to perceive the actual truths of the question, and to apply them practically."

Notes on Nuisances, Drains, and Dwellings: their Detection and Cure. By W. H. PENNING, F.G.S. 6*d.*

"The directions, which are plain, sound, and practical, will be found useful in every household."—*The Doctor.*

"This little pamphlet should be studied by everybody."—*Scientific Review.*

"This is an admirable and most useful little book."—*Figaro.*

School Epidemics, especially Scarlet Fever. By a PRACTICAL NURSE. 4*d.*

On Scarlatina: its Nature and Treatment. By I. BAKER BROWN, F.R.C.S. (Exam.), late Surgeon Accoucheur to, and Lecturer on Diseases of Women and Children at, St. Mary's Hospital. Third edition, 3*s.*

By the same Author, 1*s.*,

Sterility: its Causes and Treatment. Being a Paper read before the Medical Society of London, and printed by request.

Notes on the Pharmacopœial Preparations. Specially arranged for the use of Students preparing for Examinations, and as a Note-book for General Practitioners.

By HANDSEL GRIFFITHS, Ph.D., L.R.C.P., &c., Librarian to the Royal College of Surgeons of Ireland. *2s. 6d.*

"Will be found useful to students engaged in the study of Materia Medica and the Pharmacopœia; the Notes are faithful."—*The Lancet.*

"From the many excellences of the work, we can confidently recommend it as a most valuable help for those who are preparing for medical examinations."—*Students' Journal.*

"The student has only to turn to one section to appreciate the succinctness and accuracy with which Dr. Handsel Griffiths has condensed into brief compass the chief points that he need know about them."—*Pharmaceutical Journal.*

"We feel sure that students will welcome a book so well calculated to aid them in the study of this necessary branch of their curriculum."—*Guy's Hospital Gazette.*

By the same Author, second edition, 1*s.*,

Posological Tables: Being a Classified Chart of Doses; showing at a glance the Dose of every Officinal Substance and Preparation. For the use of Practitioners and Students.

"We welcome these Tables, which are the best we have seen, as a great boon to students and practitioners."—*Hospital Gazette.*

"For reference they will be almost as valuable to the prescribing physician as to the student, and will doubtless occupy a prominent position in many consulting-rooms."—*Students' Journal.*

"The Local Government Board might advantageously consider the propriety of supplying every dispensary and workhouse with a copy, the cost of which would weigh little against the benefit which such ready information would be to the Poor Law service."—*Medical Press and Circular.*

Also by the same Author, 1*s. 6d.*,

A System of Botanical Analysis, applied to the Diagnosis of British Natural Orders, for the Use of Beginners.

"Backed by such high authority as Professors Bentley, Henslow, and other eminent botanists, we can safely introduce it to the notice of our readers."—*Students' Journal.*

"The author has placed the student under considerable obligations by his system of botanical analysis."—*Pharmaceutical Journal.*

Chemistry in its Application to the Arts and Manufactures. A Text-Book by RICHARDSON and WATTS.

Vol. I. : Parts 1 and 2.—Fuel and its Applications. 433 Engravings, and 4 Plates . . . . . £1 16*s.*

Part 3.—Acids, Alkalies, Salts, Soap, Soda, Chlorine and its Bleaching Compounds, Iodine, Bromine, Alkalimetry, Glycerine, Railway Grease, &c., their Manufacture and Applications . . . £1 13*s.*

Part 4.—Phosphorus, Mineral Waters, Gunpowder, Guncotton, Fireworks, Aluminium, Stannates, Tungstates, Chromates and Silicates of Potash and Soda, Lucifer Matches . . . £1 1*s.*

Part 5.—Prussiate of Potash, Oxalic Acid, Tartaric Acid, Many Tables, Plates, and Wood Engravings, £1 16*s.*

Parts 3, 4, and 5 separately, forming a complete

Practical Treatise on Acids, Alkalies, and Salts : their Manufacture and Application. In three vols., £4 10*s.*

Collenette's Chemical Tables : Oxides, Sulphides, and Chlorides, with Blank Forms for Adaptation to other Compounds. Arranged for the use of Teachers and Students, by Professor COLLENETTE. 6*d.*

"We have great pleasure in recommending this little work to all who are interested in having the study of chemistry simplified and methodically treated."—*Chemical News.*

"An excellent means for the communication of much valuable information."—*Chemist and Druggist.*

Chemistry in its Relation to Physiology and Medicine. By GEORGE E. DAY, M.A. Cantab., M.D., F.R.S., late Professor of Medicine in the University of St. Andrews. 10*s.*

A Practical Text-Book of Inorganic Chemistry, including the Preparation of Substances, and their Qualitative and Quantitative Analyses, with Organic Analyses. By D. CAMPBELL, late Demonstrator of Practical Chemistry in University College. 5*s.* 6*d.*

Rudiments of Chemistry, with Illustrations of the Chemistry of Daily Life. Fourth Edition, with 130 Woodcuts. By D. B. REID, M.D., F.R.S., F.R.C.P. Edin. 2*s.* 6*d.*

The Chemical and Physiological Balance of Organic Nature : an Essay. 1 vol., 12mo. By Professors DUMAS and BOUSSINGAULT. 4*s.*

Elements of Chemistry; including the application of the Science in the Arts.

By T. GRAHAM, F.R.S.,

late Master of the Mint. Second Edition, revised and enlarged. Illustrated with Woodcuts. 2 vols., 8vo. £2.

Ditto. Vol. II. Edited by H. WATTS, M.C.S. Separately. £1.

Practical Treatise on the Use of the Microscope.

By J. QUECKETT.

Illustrated with 11 Steel Plates and 300 Wood Engravings. Third Edition, 8vo., published at £1 1*s.*, reduced to 12*s.* 6*d.*

Lectures on Histology: Elementary Tissues of Plants and Animals. On the Structure of the Skeletons of Plants and Invertebrate Animals. 2 vols., 8vo. Illustrated by 340 Woodcuts. By the same Author. £1 8*s.* 6*d.*

Introduction to Cryptogamic Botany. 8vo. Illustrated with 127 Engravings. By Rev. M. J. BERKELEY. £1.

A Practical Treatise on Coal, Petroleum, and other Distilled Oils. Illustrated with 42 Figures, and a View on Oil Creek, in Pennsylvania. 8vo.

By A. GESNER. 10*s.* 6*d.*

Practical Mineralogy; or, a Compendium of the Distinguishing Characters of Minerals, by which the Name of any Species may be speedily ascertained. 8vo., with 13 Engravings, showing 270 Specimens.

By E. J. CHAPMAN. 7*s.*

Schleiden's Plants: a Biography, in a Series of Fourteen Popular Lectures on Botany.

Edited by Professor HENFREY.

Second Edition, 8vo., with 7 Coloured Plates and 16 Woodcuts. 15*s.*

The Architecture of the Heavens.

By J. P. NICHOL,

Professor of Astronomy in the University of Glasgow. Ninth Edition, entirely revised and greatly enlarged. Illustrated with 23 Steel Engravings and numerous Woodcuts. 16*s.*

Engineering Precedents for Steam Machinery: embracing the Performances of Steamships, Experiments with Propelling Instruments, Condensers, Boilers, &c., accompanied by Analyses of the same; the whole being original matter, and arranged in the most practical and useful manner for Engineers. 2 vols., 8vo. With Plates and Tables.

By B. E. ISHERWOOD,
Chief Engineer United States Navy. 15*s.*

In Preparation,

The Protoplasmic Theory of Life.

By J. DRYSDALE, M.D. Edin.

Now ready, by the same Author,

Life and the Equivalence of Force.

Part I. Historical Notice of the Discovery of the Law of Equivalence of Force. 1*s.*

Part II. Nature of Force and Life: containing the Harmony of Fletcher and Beale. 1*s.* 6*d.*

"The book is well worth perusal."—*Westminster Review.*

"We cannot part from this work without praising the calm and excellent spirit in which the subject is handled. Dr. Drysdale exhibits an earnest love of truth, and considerable ingenuity and power."—*The Examiner.*

Part III. [conclusion] ready shortly.

Practical Lessons in the Nature and Treatment of the Affections produced by the Contagious Diseases; with Chapters on Syphilitic Inoculation, Infantile Syphilis, and the Results of the Contagious Diseases Acts. Sixty coloured and plain Illustrations.

By JOHN MORGAN, M.D., F.R.C.S.,
Professor of Anatomy in the Royal College of Surgeons, Physician to the Lock Hospitals, Dublin. Second thousand. Paper wrapper, 5*s.*; cloth, 6*s.*

"Contains much that is original and of practical importance."—*The Lancet.*

"This is a most instructive work, and reflects great credit on Dr. Morgan."—*The Medical Press and Circular.*

By the same Author,

The Dangers of Chloroform and the Safety and Efficiency of Ether as an Agent in securing the Avoidance of Pain in Surgical Operations. Second thousand. Cloth, 2*s.*

Responsibility and Disease: an Essay upon moot points in Medical Jurisprudence, about which Medical Men should not fail to be well instructed.

By J. H. BALFOUR BROWNE, Barrister-at-Law, Author of "The Medical Jurisprudence of Insanity," &c. *2s.*

On Mental Capacity in Relation to Insanity, Crime, and Modern Society.

By CHRISTOPHER SMITH, M.D. (late of Paris). *3s. 6d.*

Via Medica: a Treatise on the Laws and Customs of the Medical Profession, in relation especially to Principals and Assistants; with Suggestions and Advice to Pupils on Preliminary Education.

By J. BAXTER LANGLEY, LL.D., M.R.C.S., F.L.S. Fourth Edition, *3s.*

Syphilis: Its Nature and Treatment.

By CHARLES R. DRYSDALE, M.D., F.R.C.S., Physician to the Metropolitan Free Hospital; late Secretary Harveian Medical Society's Committee for the Prevention of Venereal Diseases. Second Edition, *4s. 6d.*

"We bespeak a cordial welcome to this new work, which contains in a moderate compass the conclusions of an industrious, painstaking syphilographer."—*Medical Press and Circular.*

By the same Author,

Alpine Heights and Climate in Consumption. *1s.*

Medicine as a Profession for Women. *1s.*

Also,

The Population Difficulty. *6d.*

Functional Derangements and Debilities of the Generative System: their Nature and Treatment.

By F. B. COURTNAY, M.R.C.S. Eighth Edition, *3s.*

Modern Hydropathy: with Practical Remarks upon Baths, in Acute and Chronic Diseases.

By JAMES WILLIAMS, M.D., M.R.C.S. Fifth Edition. limp cloth, *2s.*

Practical Guide to the Baths of Aix in Savoy.

By the Baron DESPINE, Physician. *2s.*

Horses: their Rational Treatment, and the Causes of their Premature Decay. By Amateur. *5s.*

An Abridgment of the above. *1s.*

WORKS BY DR. ROTH.

1. **The Prevention and Cure of many Chronic Diseases** by Movements. With Ninety Engravings. 10*s.*
2. **The Handbook of the Movement-Cure.** With One Hundred and Fifty-five Original Engravings. 10*s.*
3. **Contributions to the Hygienic Treatment of Paralysis,** and of Paralytic Deformities. With Thirty-Eight Engravings. Illustrated by Numerous Cases. 3*s.* 6*d.*
4. **The Prevention of Spinal Deformities,** especially of Lateral Curvature; with Notes. 3*s.* 6*d.*
5. **On Paralysis in Infancy, Childhood, and Youth.** With Forty-five Engravings. 3*s.* 6*d.*
6. **A Short Sketch of Rational Medical Gymnastics,** or the Movement-Cure. With Thirty-eight Engravings. 1*s.*
7. **Table, showing a few Injurious Positions,** and some Deformities of the Spine, produced partly by bad positions, and tight lacing. With Forty-six Engravings. 6*d.*
8. **A Table of a Few Gymnastic Exercises without** Apparatus. With Thirty-three Wood Engravings. 6*d.*
9. **Gymnastic Exercises on Apparatus,** according to the Rational System of LING. With Eighty Illustrations. 1*s.*
10. **The Gymnastic Exercises of Ling.** Arranged by Dr. Rothstein; translated by Dr. Roth. Second Edition. 2*s.* 6*d.*
11. **The Russian Bath:** with some Suggestions regarding Public Health. Second Edition. 1*s.*
12. **On the Causes of the Great Mortality of Children,** and the Means of Diminishing them. 3*d.*
13. **On the Importance of Rational Gymnastics** as a Branch of National Education: a Letter to Lord Granville. 1*s.*
14. **On Scientific Physical Training and Rational Gymnastics;** a Lecture. 1*s.*
15. **Exercises or Movements,** according to LING's System. With Forty-two Illustrations. Fourth Edition. 1*s.*
16. **Two Tables of Gymnastic Exercises without Apparatus;** with Explanations. 1*s.*
17. **A Plea for the Compulsory Teaching of Physical** Education. 1*s.*

MISCELLANEOUS.

THE CRY OF ITALY AGAINST THE ROMISH CHURCH.

The Religion of Rome described by a Roman. Translated, with Introduction and Notes,

By WILLIAM HOWITT,

Author of "The History of Priestcraft," "Homes and Haunts of British Poets," &c., &c. 8*s*.

"Should be read by all."—*Standard.*

"The object is to prove the emptiness of Roman Ecclesiastical Religion, and the moral unfitness of many of its chief professors to act as religious teachers. A closing chapter upon Catholicism in Spain, and the influence of the priesthood on political affairs in that country, is of special interest at the present moment."—*The Mail* (*Evening Edition of The Times*).

"Mr. Howitt has seen Old Giant Pope at home, and marked for himself the monster's baleful influence. To his testimony we can add our own corroborating witness, and so, we believe, can every sojourner in Italy. Written with great vigour and vivacity."—*Mr. Spurgeon in the "Sword and Trowel."*

"The value of the work lies in its contemporary character."—*Literary Churchman.*

"A scathing and unflinching revelation of the iniquities inseparable from the Papal system."—*The Rock.*

"This is a book which we hope will excite much public attention."—*Evangelical Magazine.*

"The book bristles with facts which ought to startle and arouse."—*Surrey Congregational Magazine.*

"For a real view of the blessings of Popery we must study its growth, and development, and influence in its own real home. The book before us enables us to understand something of what it is and what it has done."—*Literary World.*

"There is no probability of controverting such a work as this, and if it were generally read throughout England, we believe it would give Popery a deadly wound in this country."—*Protestant Opinion.*

"This is in every sense a seasonable book, and deserves a wide circulation."—*Watchman.*

"The book remains an exhaustive and telling indictment against the whole pontifical system."—*The Examiner.*

Cheerful Words: Being a Volume of Twenty-six Sermons, specially adapted for delivery before Inmates of Asylums, Unions, Workhouses, Hospitals, Gaols, Penitentiaries, and other Public Institutions. Composed by distinguished Dignitaries of the Church, and Clergymen. Edited by WM. HYSLOP, Proprietor of the Stretton House Private Asylum for Gentlemen, Church Stretton, Shropshire. 5*s.*

Hymnologia Christiana Latina; or, a Century of Psalms and Hymns and Spiritual Songs. By Various Authors, from LUTHER to HEBER. Translated into Latin Verse by the Rev. RICHARD BINGHAM, M.A. 5*s.*

"There are something under a hundred and twenty versions in this elegant little volume, many of them of considerable length. It is valuable, merely as an evidence of that elaborate cultivation, that perfect polish of classical scholarship, which it is very good for the world at large that some men should possess."—*Literary Churchman.*

"We can honestly commend the book."—*Illustrated Review.*

A Physician's Sermon to Young Men. By WILLIAM PRATT, M.A., M.D., &c. 1*s.*

"The delicate topic is handled wisely, judiciously, and religiously, as well as very plainly."—*Guardian.*

Electricity Made Plain and Useful. By JOHN WESLEY, M.A. Second Edition, 2*s.* 6*d.* A Popular Edition, 1*s.*

"A curious and entertaining little work."—*Literary Churchman.*

Glimpses of a Brighter Land. Cloth extra, 2*s.* 6*d.*

Manual Alphabet for the Deaf and Dumb. Official. 6*d.*

Brilliant Prospects. A Novel. By R. L. JOHNSON, M.D. 3*s.* 6*d.*

Queer Customers. By the same Author. 1*s.*

My First Start in Practice. By the same Author. 1*s.*

Curative Mesmerism. By Professor ADOLPHE DIDIER. 1*s.*

Constipation: its Causes and Consequences. With Hints. By a CLERGYMAN. 1*s.*

Patent Wrinkles. With Practical Suggestions, written in a humorous style, for Amendment of the Patent Laws. 1*s.*

Revelations of Quacks and Quackery. Giving a complete Directory of the London and Provincial Quack Doctors; with Facts and Cases in Illustration of their Nefarious Practices. Twenty-fifth thousand. 1*s.* 6*d.*

"The narrative is too good to be abridged, and ought to be, as we believe it is, largely circulated, which is no less than it deserves, both for its fearless tone, and for the care and research which have been bestowed on its compilation."—*Saturday Review.*

"Buy, therefore, reader, by all means buy 'Revelations of Quacks and Quackery.' Its contents will amuse and astonish you, while they invoke your indignation and disgust."—*Punch.*

PERIODICAL PUBLICATIONS.

The Medical Press and Circular. Established 1838. Published every Wednesday Morning in London, Dublin, and Edinburgh. Is one of the oldest and most influential of the Medical Journals. 5*d.* Per annum, post free, £1 2*s.* 6*d.*

The Student's Journal and Hospital Gazette. A Fortnightly Review of Medicine, Surgery, Arts, Science, Literature, and the Drama. The only Paper that represents the whole body of Medical Students in the United Kingdom. 4*d.* Per annum, post free, 7*s.* 6*d.*

The Doctor. A Monthly Review of British and Foreign Medical Practice and Literature. Published on the 1st of every Month. 6*d.* Per annum, post free, 6*s.*

Anthropologia. The Quarterly Journal of the London Anthropological Society. 4*s.* each part.

The Ecclesiastical Gazette; or, Monthly Register of the Affairs of the Church of England. Established 1838. Published on the Second Tuesday in every Month, and sent to the Dignitaries of the Church at home and abroad, Heads of Colleges, and the Clergymen of every Parish in England and Wales. 6*d.* Per annum, post free, 6*s.*

The Clergy List (Annual). Established 1841. Contains Alphabetical Lists of the Clergy at Home and Abroad. Benefices in England and Wales, with Post Towns, Incumbents, Curates, Patrons, Annual Value, Population, &c. The Patronage of the Crown, Lord Chancellor, Archbishops, Bishops, Deans, Universities, Private Patronage, &c., &c. 10*s.*

The Irish Medical Directory (Annual). Contains a complete Directory of the Profession in Ireland; their Residences and Qualifications; the Public Offices which they hold, or have held; the Dates of Appointments; and the published Writings for which they are distinguished. 5*s.*

The Medical Register and Directory of the United States of America. Containing the Names and Addresses of about 70,000 Practitioners of all grades, systematically arranged by States. Early in 1874. 25*s.*

STANDARD FRENCH WORKS.

	£	s.	d.
Alvarenga.—Thermométrie clinique	0	5	0
Anger.—Nouveaux éléments d'anatomie chirurgicale, avec atlas	2	0	0
——— Maladies chirurgicales nouvelles fractures et luxations, coloriées	7	10	0
Anglada.—Etudes sur les maladies nouvelles et les maladies éteintes	0	8	0
Barnes.—Leçons sur les opérations obstétricales	0	12	0
Barthes et Rilliet.—Traité clinique et pratique des maladies des enfants - - - 3 *vols.*	1	5	0
Bayard.—Traité pratique des maladies de l'estomac	0	10	0
Beaude.—Dictionnaire de médecine usuelle à l'usage des gens du monde - - - 2 *vols.*	1	10	0
Beaunis et Bouchard.—Nouveaux éléments d'anatomie descriptive	0	18	0
Becquerel.—Traité des applications de l'électricité à la thérapeutique médicale et chirurgicale	0	7	0
——— Traité élémentaire d'hygiène privée et publique	0	8	0
Beraud.—Atlas complet d'anatomie chirurgicale topographique	3	0	0
——— Ditto ditto, with coloured plates	6	0	0
——— et **Robin.**—Manuel de physiologie de l'homme et des principaux vertèbrés - - 2 *vols.*	0	12	0
——— et **Velpeau.**—Manuel d'anatomie générale et thérapeutique	0	7	0
Bergeret.—Abus des boissons alcooliques	0	3	0
——— Fraudes dans l'accomplissement des fonctions génératrices	0	2	6
Bernard-Chevell.—Leçons de physiologie expérimentale appliquée à la médecine	0	14	0
——— Leçons sur les effets des substances toxiques et médicamenteuses	0	7	0
——— Leçons sur la physiologie et la pathologie du système nerveux - - 2 *vols.*	0	14	0
——— Leçons sur les propriétés physiologiques et les altérations pathologiques des liquides de l'organisme 2 *vols.*	0	14	0
——— Leçons de pathologie expérimentale	0	7	0
——— De la physiologie générale	0	6	0
——— et **Huette.**—Précis iconographique de médecine opératoire et d'anatomie chirurgicale	1	4	0
——— Ditto ditto, with coloured plates	2	8	0
——— Ditto ditto, plain	0	3	0
——— Ditto ditto, coloured	0	6	0
——— Premiers secours aux blessés	0	2	0

	£	s.	d.
Best.—Leçons sur la physiologie comparée de la respiration -	0	10	0
Bocquillon.—Manuel d'histoire naturelle médicale - 2 *vols.*	0	14	0
Boisseau.—Des maladies simulées et des moyens de les reconnaitre - - - - -	0	7	0
Boivin et Duges.—Anatomie pathologique de l'uterus et de ses annexes - - - -	2	5	0
Bonnafont.—Théorie et pratique des maladies de l'orielle, et des organes de l'audition - - -	0	10	0
Bouchardat.—Du diabète sucré ou glovcosurié - -	0	4	6
——— Annuaire de thérapeutique, de matière médicale, de pharmacie, et de toxicologie - -	0	1	2
——— Formulaire vétérinaire - - -	0	4	0
——— Manuel de matière médicale, de thérapeutique comparée, et de pharmacie - - 2 *vols.*	0	14	0
——— Nouveau formulaire magistral - - -	0	3	0
——— Manuel des sciences médicales - - -	0	16	0
Bouchut.—Histoire de la médecine et des doctrines - 2 *vols.*	0	16	0
——— Nouveaux éléments de pathologie générale et de sémeiologie - - - - -	1	0	0
——— Traité pratique des maladies des nouveau-nés -	0	14	0
——— et **Despres.**—Dictionnaire de médecine et de thérapeutique - - - -	1	5	0
Boudin.—Traité de géographie et de statistique médicales, et des maladies endémiques - - 2 *vols.*	1	0	0
Bouilland.—Traité clinique des maladies du cœur -	0	16	0
Bourgery.—Traité complet de l'anatomie de l'homme, comprenant la médecine opératoire, dessiné d'après nature, par H. Jacob—8 vols. folio, with 726 plates - - - - -	30	0	0
——— Ditto ditto, with coloured plates - -	50	0	0
——— et **Jacob.**—Anatomie élémentaire en 20 planches, représentant chacune un sujet dans son entier à la proportion de demi-nature, avec un texte explicatif plain - - - - -	10	0	0
——— Ditto ditto, coloured - - -	20	0	0
Bourgois.—Les passions dans leurs rapports avec la santé et les maladies - - - -	0	2	0
Brehen.—La vie des animaux illustrée Les mammifères 2 *vols.*	1	1	0
——— Ditto ditto Les oiseaux 2 *vols.*	1	1	0
Briand et Chaude.—Manuel complet de médecine légale -	0	18	0
Burdel.—Du cancer considéré comme souche tuberculeuse -	0	3	0
Carles.—Étude sur les quinquinas - - -	0	2	6
Casper.—Traité pratique de médecine légale, traduit de l'Allemand par M. G. Baillière - - 2 *vols.*	0	15	0
——— Coloured atlas separately - - -	0	12	0
Cauvet.—Nouveaux éléments d'histoire naturelle médicale, 2 *vols.*	0	12	0
Cerise.—Mélanges médico-psycologiques - - -	0	7	6
Chailly-Honore.—Traité pratique de l'art des accouchements - - - - -	0	10	0

	£	s.	d.
Chauffard.—De la fièvre traumatique, etc. - -	0	3	6
Chauveau.—Traité d'anatomie comparée des animaux domestiques - - - - -	1	0	0
Civiale.—Traité pratique sur les maladies des organes génito-urinaires - - - 3 *vols.*	1	4	0
Codex Médicamentarius, pharmacopée française, rédigée par ordre du gouvernement - - - -	0	10	6
Colin.—Traité de physiologie comparée des animaux 2 *vols.*	1	6	0
Comite.—Consultatif d'hygiène publique de France, recueil destravaux et des actes officiels de l'administration sanitaires, chaque vol. - - -	0	8	0
Comte.—Structure et physiologie de l'homme, demontrées à l'aide des figures coloriées, découpées, et superposées	0	4	6
Corlieu.—Aide-mémoire de médecine, de chirurgie, et d'accouchements - - - - -	0	6	0
Cornil et Ranvier.—Manuel d'histologie pathologique. Parts I. and II., chaque - - -	0	4	6
Coze et Feltz.—Recherches cliniques et expérimentales sur les maladies infectieuses - - -	0	6	0
Cruveilhier. — Traité d'anatomie pathologique générale 5 *vols.*	1	15	0
——— Anatomie pathologique du corps humain. 41 livraisons, chaque - - - - -	0	11	0
Cuvier.—Les oiseaux décrits et figures. 72 planches, 464 figures, noires - - - -	1	10	0
——— Ditto ditto, coloriées - - - -	2	10	0
——— Les mollusques. 56 planches, 520 figures, noires -	0	15	0
——— Ditto ditto, coloriées - - -	1	5	0
——— Les vers et les zoophytes. 37 planches, 520 figures, noires - - - - -	0	15	0
——— Ditto ditto coloriées - - - -	1	5	0
Cyon.—Principes d'électrothérapie - - -	0	4	0
Cyr.—Traité d'alimentation, dans ses rapports avec la physiologie, la pathologie, et la thérapeutique -	0	8	0
Daremberg.—Histoire des sciences médicales - 2 *vols.*	1	0	0
——— Médecine, histoire et doctrines - - -	0	3	6
Davaine.—Traité des entozoaires et des maladies vermineuses de l'homme et des animaux domestiques -	0	12	0
Demarquay.—De la régénération des organes et des tissus -	0	16	0
Deschampes.—Compendium de pharmacie pratique -	1	0	0
Deslandes.—De l'onanisme et des autres abus vénériens -	0	7	0
Desmarres.—Chirurgie oculaire - - -	0	8	0
Despres.—Rapport sur les travaux de la 7ème ambulance à l'armée du Rhin et à l'armée de la Loire -	2	0	0
Dolbeau.—Leçons de clinique chirurgicale - -	0	7	0
——— De la lithotritie périnéale - - -	0	4	0
Donne.—Hygiène des gens du monde - - -	0	4	0
Dorvault.—Officine ou répertoire générale de pharmacie pratique - - - - - -	0	17	0

	£	s.	d.
Duchartre.—Eléments de botanique, comprenant l'anatomie, l'organographie, la physiologie des plantes, les familles naturelles, et la géographie botanique -	0	18	0
Duchenne.—De l'électrisation localisée - - -	0	18	0
Durand-Fardel.—Traité pratique des maladies chroniques 2 *vols.*	1	0	0
——— Dictionnaire général des eaux minérales et d'hydrologie médicale - - - 2 *vols.*	1	0	0
——— Traité pratiques des maladies des vieillards -	0	14	0
——— Traité clinique et thérapeutique du diabète -	0	5	0
Duval et Lereboullet.—Manuel du microscope -	0	5	0
Farabœuf.—Ligature des artères - - -	0	4	0
Follin et Duplay.—Traité élémentaire de pathologie externe. Vols. I., II., et III. - - -	1	17	0
Fonssagrives.—Hygiène alimentaire des malades, des convalescents, et des valétudinaires - -	0	9	0
Fort.—Pathologie et clinique chirurgicales - 2 *vols.*	1	5	0
Foville.—Étude clinique de la folie, avec prédominance du délire des grandeurs - - -	0	4	0
——— Moyens de combattre l'ivrognerie - -	0	5	0
Galante.—Emploi du caoutchouc vulcanisé dans la thérapeutique médico-chirurgicale - - - -	0	5	0
Galezowski.—Traité des maladies des yeux - -	1	0	0
——— Du diagnostic des maladies des yeux par la chromatoscopie rétinienne - - -	0	7	0
Gallard.—Leçons cliniques sur les maladies des femmes -	0	12	0
Gallez.—Histoire des kystes de l'ovaire - - -	0	12	0
Ganot.—Traité élémentaire de physique, expérimentale et appliquée, et de météorologie - - -	0	7	0
Garnier.—Dictionnaire annuel du progrès des sciences et institutions médicales - - - -	0	7	0
Garrigou.—Bagnères de Luchon - - - -	0	8	0
Gaujot et Spillmann.—Arsenal de la chirurgie contemporaine - - - - - 2 *vols.*	1	12	0
Gervais et Van Benenden.—Zoologie médicale - -	0	15	0
Gintrac.—Cours théorique et clinique de pathologie interne et de thérapie médicale - - 9 *vols.*	3	3	0
Girard.—Traité élémentaire d'entomologie coléoptères. Avec atlas, colorié - - - - -	3	0	0
——— Ditto, ditto, noire - - - - -	1	10	0
Gloner.—Nouveau dictionnaire de thérapeutique - -	0	7	0
Godron.—De l'espèce et des races dans les êtres organisées -	0	12	0
Goffres.—Précis iconographique des bandages, pansements, et appareils - - - - - - -	1	16	0
——— Ditto, ditto, in parts, plain - - - -	0	3	0
——— Ditto, ditto, in parts, coloured - - -	0	6	0
Gori.—Des hôpitaux, tentes, et baraques - - -	0	3	0
Gosselin.—Clinique chirurgicale de l'hôpital de la Charité 2 *vols.*	1	4	0

	£	s.	d.
Goubert.—Manuel de l'art des autopsies cadavériques, surtout dans les applications à l'anatomie pathologique -	0	6	0
Graefe.—Clinique opthalmique - - - -	0	8	0
Grehant.—Manuel de physique médicale - - -	0	7	0
Grellois.—Histoire médicale du blocus de Metz - -	0	6	0
Gubler.—Commentaires thérapeutiques du codex médicamentarius - - - - - -	0	13	0
Guibourt.—Histoire naturelle des drogues simples 4 *vols.*	1	16	0
Guyon.—Eléments de chirurgie clinique - - -	0	12	0
Hacquart.—Botanique médicale - - - -	0	6	0
Herard et Cornil.—De la phthisie pulmonaire - -	0	10	0
Houel.—Manuel d'anatomie pathologique générale - -	0	7	0
Jamain.—Manuel de pathologie et de clinique chirurgicales 2 *vols.*	0	15	0
——— Manuel de petite chirurgie - - - - -	0	7	0
——— Nouveau traité élémentaire d'anatomie descriptive et des préparations anatomiques - - -	0	12	0
——— Figures coloriées - - - - -	2	0	0
Jeannel.—Prostitution dans les grandes villes aux dix-neuvième siècle - - - - - - -	0	4	6
——— Formulaire magistral et officinal international -	0	6	0
Jobert (de Lomballe).—De la réunion en chirurgie -	0	12	0
Kiess et Duval.—Cours de physiologie - - -	0	7	0
Kiener.—Spécies général et iconographique des coquilles vivantes, continuée par le Docteur Fischer. Genre Turbo, avec 43 planches gravies et coloriées -	2	10	0
——— Genre Trochus (paraîtra prochainement) - -			
Lancereaux et Lackerbauer.—Atlas d'anatomie pathologique - - - - - -	4	0	0
Lecour.—Prostitution - - - - -	0	4	6
Le Fort.—La chirurgie militaire et les sociétés de secours en France et à l'étranger - - - -	0	10	0
——— Traité de chimie hydrologique - - -	0	12	0
Legouest.—Traité de chirurgie de l'armée - -	0	12	0
Lemaire.—Acide phénique - - - -	0	6	0
Levy.—Traité d'hygiène publique et privée 2 *vols.*	1	0	0
Liebriech.—Atlas d'ophthalmoscopie représentant l'état normal et les modifications pathologiques du fond de l'œil visibles à l'ophthalmoscope - -	1	10	0
Littre et Robin.—Dictionnaire de médecine, de chirurgie, de pharmacie, de l'art vétérinaire et des sciences qui s'y rapportent - 2 *vols.*	1	0	0
Lorain.—Études de médecine clinique : Le choléra, observé à l'hôpital Saint Antoine - - - -	0	7	0
——— Le pouls, ses variations et ses formes diverses dans les maladies - - - - - -	0	10	0
Luys.—Iconographie photographique des centres nerveux -	7	10	0
Mailliot.—Auscultation - - - - -	0	12	0
Malgaigne.—Manuel de médecine opératoire - -	0	7	0
——— Traité d'anatomie chirurgicale et de chirurgie expérimentale - - - - - 2 *vols.*	0	18	0

	£	*s.*	*d.*
Mandl.—Maladies du larynx et du pharynx	0	18	0
Marais.—Guide pratique pour l'analyse des urines	0	3	6
Marce.—Traité pratique des maladies mentales	0	8	0
——— Recherches cliniques et anatomo-pathologiques	0	1	6
Marchant.—Etude sur les maladies épidémiques	0	1	0
Marvaud.—Effets physiologiques et thérapeutiques des aliments d'épargne ou antidéperditeurs	0	3	6
Maunory et Salmon. — Manuel de l'art des accouchements	0	7	0
Mayer.—Rapports conjugaux, considérés sous le triple point de vue de la population, de la santé, et de la morale publique	0	3	0
Mayer.—Mémoire sur le mouvement organique dans ses rapports avec la nutrition	0	3	0
Meyer.—Traité des maladies des yeux	0	10	0
Montmeja.—Pathologie iconographique du fond de l'œil, traité d'ophthalmoscope	0	18	0
Moquin-Tandon.—Eléments de botanique médicale	0	6	0
——— Éléments de zoologie médicale	0	6	0
Morel.—Traité d'histologie humaine	0	12	0
Naegele et Grenser.—Traité pratique de l'art des accouchements	0	12	0
Naquet.—Principes de chimie fondée sur les théories modernes *2 vols.*	0	10	0
Nelaton.—Éléments de pathologie chirurgicale - *3 vols.*	1	9	0
Nielly.—Manuel d'obstétrique ou aide-memoire de l'élève et du praticien	0	4	0
Niemeyer.—Pathologie interne - *2 vols.*	0	14	0
Onimus et Legros.—Traité d'électricité médicale	0	12	0
Penard.—Guide pratique de l'accoucheur et de la sage-femme	0	4	0
Peter.—Leçons de clinique médicale - *vol. 1.*	0	15	0
Petrequin.—Nouveaux mélanges de chirurgie et de médecine	0	7	6
Pidoux.—Etudes sur la phthisie	0	9	0
Poggiale.—Traité d'analyse clinique par la méthode des volumes	0	9	0
Quatrefages et Hamy.—Les crânes des races humaines	0	14	0
Quetelet.—Anthromopetrie, ou mesure des différentes facultés de l'homme	0	12	0
——— Physique sociale, ou essai sur le développement des facultés de l'homme - *2 vols.*	1	0	0
Raciborski.—Histoire des découvertes relatives au système veineux	0	3	0
——— Traité de la menstruation	0	12	0
Racle.—Traité de diagnostic médical, guide clinique pour l'étude des signes caractéristiques des maladies	0	7	0
Reindfleisch.—Traité d'histologie pathologique, traduit par Dr. Gross	0	14	0
Requin.—Éléments de pathologie médicale - *4 vols.*	1	10	0
Richet, A.—Traité pratique d'anatomie médico-chirurgicale	0	18	0

	£	s.	d.
Robin.—Programme du cours d'histologie	0	6	0
Robin.—Traité du microscope	1	0	0
——— Anatomie et Physiologie cellulaire	0	16	0
Roubaud.—Traité de l'impuissance et de la stérilité chez l'homme et chez la femme	0	8	0
Saboia.—Accouchements	0	13	0
Sandras et Bourguinon.—Traité pratique des maladies nerveuses 2 *vols.*	0	12	0
Saint-Vincent.—Nouvelle médecine des familles à la ville et à la campagne	0	3	6
Schimper.—Traité de paleontologie végétale vols. 1 and 2 vol. 3 sous presse.	5	0	0
Sedillot et Legouest.—Traité de médecine opératoire 2 *vols.*	1	0	0
Senac.—Traitment des coliques hépatiques	0	4	0
Tardieu.—Dictionnaire d'hygiène publique et de salubrité 4 *vols.*	1	12	0
——— ÉTUDE MEDICO-LEGALE sur les blessures par imprudence, l'homicide, et les coups involontaires	0	3	6
——— Ditto ditto sur la pendaison, la strangulation, et la suffocation	0	5	0
——— Ditto ditto sur l'avortement	0	4	0
——— Ditto ditto sur l'empoisonnement	0	12	0
——— Ditto ditto sur les attentats aux mœurs	0	4	6
——— Ditto ditto sur l'infanticide	0	6	0
——— Ditto ditto sur la folie	0	7	0
——— Ditto ditto sur l'identité	0	3	0
——— Manuel de pathologie et de chirurgie médicales	0	7	0
Trousseau. — Clinique médicale de l'Hôtel-Dieu de Paris 3 *vols.*	1	12	0
Valleix.—Guide du médecin praticien, résumé général de pathologie interne et de thérapeutique appliquées 5 *vols.*	2	10	0
Vandercolme.—Histoire botanique et thérapeutique des salsepareilles	0	3	6
Vaslin.—Plaies par armes à feu	0	6	0
Vidal.—Traité de pathologie externe et de médecine opératoire 5 *vols.*	2	0	0
Virchow.—Pathologie des tumeurs 3 *vols.*	1	16	0
Vulpian.—Leçons de physiologie générale et comparée du système nerveux faites au musée d'histoire naturelle	0	10	0
Wagner.—Traité de chimie industrielle 2 *vols.*	1	0	0
Wolliez.—Dictionnaire de diagnostic médical, comprenant le diagnostic raisonné de chaque maladie, leur signes, &c.	0	16	0
Wundt.—Traité élémentaire de physique médicale, traduit de l'allemand par le Dr. Monoyer	0	12	0
——— Nouveaux éléments de physiologie humaine	0	14	0
Wunderlich.—De la température dans les maladies	0	10	0

BIBLIOTHEQUE

DE

PHILOSOPHIE CONTEMPORAINE.

In Volumes 2*s.* 6*d.* each.

Alaux.—Philosophie de M. Cousin.
Auber, Ed.—Philosophie de la médecine.
Beauquier.—Philosophie de la musique.
Beaussire.—Antécédents de l'Hégélianisme dans la philos. franç.
Bersot, Ernest.—Libre philosophie.
Bertauld.—L'ordre social et l'ordre moral.
Buchner, L.—Science et nature.
Bost.—Le protestantisme libéral.
Bouillier (Francisque).—Du plaisir et de la douleur.
—— De la conscience.
Boutmy, E.—Philosophie de l'architecture en Grèce.
Challemel Lacour.—La philosophie individualiste, étude sur Guillaume de Humboldt.
Coignet, C.—La morale indépendante.
Coquerel, Ath.—Origines et transformations du christianisme.
—— La conscience et la foi.
—— Histoire du credo.
Faivre.—De la variabilité des espèces.
Fontanes.—Le christianisme moderne. Étude sur Lessing.
Fonvielle, W.—L'astronomie moderne.
Franck, Ad.—Philosophie du droit pénal.
—— Philosophie du droit ecclésiastique.
—— La philosophie mystique en France aux viiie siècle.
Garnier, Ad.—De la morale dans l'antiquité.
Janet, Paul.—Le matérialisme contemporain.
—— La crise philosophique. MM. Taine, Rénan, Vacherot, Littré.
—— Le cerveau et la pensée.
Laugel, Auguste.—Les problèmes de la nature.
—— Les problèmes de la vie.
—— Les problèmes de l'âme.
—— La voix, l'oreille, et la musique.
—— L'optique et les arts.

Laveleye, Em. de.—Des formes de gouvernement.
Leblais.—Matérialisme et spiritualisme, préface par M. E. Littré.
Lemoine, Albert.—Le vitalisme et l'animisme de Stahl.
—— De la physionomie et de la parole.
Letourneau.—Physiologie des passions.
Levallois, Jules.—Déisme et christianisme.
Leveque, Charles.—Le spiritualisme dans l'art.
—— La science de l'invisible. Etude de psychologie et de théodicée.
Mariano.—La philosophie contemporaine en Italie.
Mill, Stuart.—Auguste Comte et la philosophie positive.
Milsand.—L'esthétique anglaise, étude sur John Ruskin.
Moleschott, J.—La circulation de la vie.
Odysse-Barot.—Philosophie de l'histoire.
Remusat, Charles de.—Philosophie religieuse.
Reville, A.—Histoire du dogme de la divinité de Jésus-Christ.
Saigey.—La physique moderne.
Saisset, Emile.—L'âme et la vie, une étude sur l'esthétique franc.
—— Critique et histoire de la philosophie.
Schœbel.—Philosophie de la raison pure.
Selden, Camille.—La musique en Allemagne. Mendelssohn.
Spencer, Herbert.—Classification des sciences.
Taine, H.—Le positivisme anglais, étude sur Stuart Mill.
—— L'idéalisme anglais, étude sur Carlyle.
—— De l'idéal dans l'art.
—— Philosophie de l'art.
—— Philosophie de l'art en Italie.
—— Philosophie de l'art dans les Pays-Bas.
—— Philosophie de l'art en Grèce.
Tissandier.—Des sciences occultes et du spiritisme.
Vacherot, Et.—La science et la conscience.
Vera, A.—Essais de philosophie Hégélienne.

FORMAT IN-8.

	£	*s.*	*d.*
Agassiz.—De l'espèce et des classifications	0	5	0
Bain.—Les sens et de l'intelligence			
Barni, Jules.—Le morale dans la démocratie	0	5	0
Quatrefages, de.—Darwin et ses précurseurs français	0	5	0
Saigey, Emile.—Les sciences des 18e siècle	0	5	0
Spencer, Herbert.—Les premiers principes	0	10	0
Mill, Stuart.—La philosophie de Hamilton	0	10	0

BIBLIOTHEQUE

D'HISTOIRE CONTEMPORAINE.

IN VOLUMES AT 3*s.* 6*d.*

Bagehot.—La constitution anglaise.
Barni, Jules.—Histoire des idées morales et politiques en France au XVIII^e^ siècle. 2 *vols.*
——— Les Moralistes Français des XVIII^e^ siècle.
——— Napoléon I^er.^ et son historien M. Thiers.
Barry, Herbert.—La Russie contemporaine, traduit de l'anglais.
Beaussire, Emile.—La guerre étrangère et la guerre civile.
Boert.—La guerre de 1870-71 d'après Rustow.
Bourloton, Ed.—L'Allemagne contemporaine.
Carlyle.—Histoire de la révolution française. 3 *vols.*
Clamagerau.—La France Républicaine.
De Rochau.—Histoire de la restauration.
Despois, Eug.—Le Vandalisme révolutionnaire.
Dixon, H.—La Suisse contemporaine, traduit de l'anglais.
Duvergier, De Hauranne.—La République Conservatrice.
Hillebrand.—La Prusse contemporaine et ses institutions.
Laugel, Auguste.—Les États-Unis pendant la guerre (1861-65).
Meunier, Victor.—Science et démocratie.
Montegut, Emile.—Les Pays-Bas. Impres^ns^ de voyage et d'art.
Reynald, H.—Histoire de l'Espagne depuis la mort de Charles III. jusqu'à nos jours.
Sayous, Edouard.—Histoire des Hongrois et de leur littérature politique de 1790 à 1815.
Teste, Louis.—L'Espagne contemporaine, journal d'un voyageur.
Thackeray.—Les quatre George.
Veron, Eugene.—Histoire de la Prusse depuis la mort de Frédéric II., jusqu'à la bataille de Sadowa.

FORMAT IN-8, 7*s.* EACH.

Alglave, Emile.—Histoire de l'impôt sur le Revenu en France (sous presse).

Delord, Taxile.—Histoire du second empire, 1848-69. 4 vols.

De Sybel.—Histoire de l'Europe pendant la révolution française. 2 *vols.*

Lewis, Sir G. Cornewall.—Histoire gouvernementale de l'Angleterre de 1770 jusqu'à 1830, précédé de la vie de l'auteur.

VALUABLE SCIENTIFIC DICTIONARIES IN COURSE OF PUBLICATION.

	£	*s.*	*d.*
Dictionnaire de Chimie pure et appliquée, en livraisons -	0	4	0
Dictionnaire de Medecine, de chirurgie et d'hygiène vétérinaires. Edition entièrement refondue par A. Zundel, en 6 parties, aux souscripteurs - - - - -	2	10	0
Dictionnaire Encyclopedique des Sciences Médicales publié par demi-volume de chacun 400 pages et en deux séries simultanées : la première, commençant par la lettre A ; la deuxième, par la lettre L - - - - -	0	6	0
Nouveau Dictionnaire de Medecine et de chirurgie pratiques d'environ, 30 volumes, chaque - -	0	10	0

Revue Des Deux Mondes. 1st and 15th of every Month.

Revue Scientifique de la France et de l'Etranger. Weekly. 6*d.*

Revue Politique et Literaire. Weekly. 6*d.*

Messrs. BAILLIERE, TINDALL, & COX *are the specially appointed Agents for the* Révue des Deux Mondes, *and most of the Scientific and Medical Periodicals of the Continent.*